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Food Technology Abstracts

Central Food Technological Research Institute, Mysore.

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FOOD TECHNOLOGY ABSTRACTS

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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
P	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

2281

Coleman (E). **Sports drink research.** *Food Technology* 45(3): 1991: 104-106, 108

This article reviews the research conducted to determine the benefits of consuming fluid replacement beverages during exercise. The review summarises some of the critical issues such as the influence of the type of beverage consumed on the gastric emptying rate; intestinal absorption; carbohydrate type and carbohydrate content. The results indicate that the performance improvement associated with carbohydrate beverages occurs when subjects consume 25 - 30 g of carbohydrate each hour. The review concludes with a few valuable recommendations. 22 references. CSA

FOOD PROCESSING

Nil

FOOD PACKAGING

2282

Koelsch (CM) and Labuza (TP). **Packaging, waste disposal and food safety. I. Landfilling, source reduction and recycling of plastics.** *Cereal Foods World* 36(1): 1991: 44, 46-47, 49-50, 52

Aspects reviewed in this article include: objectives of packaging, consumers concerns, general strategies for control of muncipal solid waste, landfilling of plastic, source reduction of plastic (multiple use packages, edible barriers and concn. of the product), recycling of plastics, technology of recycling, properties of recycled plastics and safety of recycled plastic as related to food. 27 references. BV

2283

Pflug (IJ), Berry (MR) and Dignan (DM). **Establishing the heat-preservation process for aseptically-packaged low-acid food containing large particulates, sterilized in a continuous heat-hold-cool system.** *Journal of Food Protection* 53(4): 1990: 312-320, 328

Aseptic packaging

2284

Baner (AL), Kalyankar (V) and Shoun (LH). **Aroma sorption evaluation of aseptic packaging.** *Journal of Food Science* 56(4): 1991: 1051-1054

A headspace method was developed for evaluating aroma sorption by polymeric packaging materials. Partition coeff. for ethyl acetate, n-hexanal, d-limonene and α-terpineol at vapour activities of 0.2 were measured between air and the materials at 25 and 40 C. Four different flexible aseptic packaging materials with barrier layers of Al foil, polyvinylidene chloride (SARAN), metallized polyester (MPET) and ethylene vinyl alcohol (EVOH) were evaluated. Temp. and aroma type had significant effects on partition coeff. No significant interactions between aromas were observed in partition coeff. The inner polyolefin sealing layer determined the aroma sorption behaviour. AS

Packaging materials

2285

Fleurat-Lessard (F) and Serrano (B). **Resistance to insect perforation of plastic films for stored-product packaging. 2. Methodological study on tests with rice weevil and larger grain borer.** *Sciences Des Aliments* 10(3): 1990: 521-532 (Fr)

Two different testing methods: sandwich test and evasion test were used to test the resistance to insect boring through flexible plastic films sealed to make hermetic bags for grain and foodstuffs storage. In sandwich test the larger grainer borer (adult) was very efficient for boring holes through single polyethylene films. Multi-foil metallic/plastic films resist 50 days atleast to the borer beetle when associated with an additional polyethylene layer. In evasion test, with insects inside the small sealed pouches, only 5 days are necessary for perforation of polyethylene pouches, without thickness dependence. The best resistance level of atleast 16 days is obtained with pouches made with multi-foil plastic film with inner polyethylene additional layer. The rice weevil cannot bore holes in the first test and only bores thinner polyethylene pouch after 50 days in evasion test. For hermetic storage purposes, the multi-foil metallic/plastic film, with polyethylene inner additional protection, is convenient for confection of small or big bags which can resist to insect damage, before grain-infesting insect die inside the pouches. BV

2286

Kaletunc (G), Normand (MD), Johnson (EA) and Peleg (M). **"Degree of elasticity" determination in solid foods.** *Journal of Food Science* 56(4): 1991: 950-953

Banana, cheese, frankfurter, jelly candy, marshmallow and potato were subjected to 4 compression-decompression cycles at two prefailure deformation levels (12.5 - 15 and 20 - 25%). Results showed that ripe banana had a recoverable work level around 20%, while the frankfurter and marshmallow were 50 - 60%. Invariably, 'degree of elasticity' increases with number of compression-decompression cycles while total work decreases. In contrast the changes were dramatic in banana, Cheddar cheese and potato flesh. The magnitude of recoverable work fraction in the 2nd to 4th cycles was a measure of the compacted material's elasticity and not that of original material. SRA

2287

Larkin (JW) and Berry (MR). **Estimating cooling process lethality for different cooling j values.** *Journal of Food Science* 56(4): 1991: 1063-1067

Cooling lethalities were determined using Ball's formula method and other lethality evaluation equations for f_c from 10-120 min, j_c of 0.25-2.21, L/D geometry values of 0.25 - 2.0, and the difference between final heating and cooling temp. of 72.2 - 111.1 C. For j_c 1.35 the Ball method overestimated the cooling lethality (42% for $j_c = 1$). For f_c of 35 - 130 min and j_c 0.7, all but one of the models that account for variable j_c were conservative in estimating cooling lethality and underestimated lethality as j_c increased above 1.41. The proposed modified hyperbolic function estimated conservative cooling lethalities over the entire range of f_c and j_c values studied and was 60% more accurate in estimating actual lethality than the next best conservative method at $j_c = 2.0$. AS

2288

Chung (SL) and Merritt (JH). **Freezing time modelling for small finite cylindrical shaped foodstuff.** *Journal of Food Science* 56(4): 1991: 1072-1075

A model was developed consisting of a modified Plank's equation to estimate phase change time and two unsteady state cross-product heat transfer equations for estimating precooling and tempering times. It accurately predicted total time to proceed from an initial temp. above the freezing point to a final temp. of -18 C. A correction factor was developed and incorporated in the P term in Plank's equation to correct for the effect of initial and freezer medium temp. and heat transfer coeff. The model, tested over a broad range of freezing conditions, had a mean absolute error of 5.9% in predicted values relative to experimental values. AS

2289

Yang (BB) and Swartzel (KR). **Photo-sensor methodology for determining residence time distributions of particles in continuous flow thermal processing systems.** *Journal of Food Science* 56(4): 1991: 1076-1081, 1086

2290

Clark (JP). **Engineering for quality.** *Cereal Foods World* 36(1): 1991: 28-30

The impact of engineering on product quality, efficiency, morale, and community is discussed separately in this article. BV

2291

Chandarana (DI), Gavin (AIII) and Wheaton (FW). **Particle/fluid interface heat transfer under UHT conditions at low particle/fluid relative velocities.** *Journal of Food Process Engineering* 13(3): 1990: 191-206

Mathematical models are often used for determining commercial thermal process schedules for heterogeneous foods processed in an aseptic processing system. The particle/fluid interface convective heat transfer coeff. is a critical input parameter for these models and must be determined experimentally. Experiments were conducted at 129.4 C in a specially designed apparatus to determine the particle fluid interface convective heat transfer coeff. for model food particles heated by Newtonian and non-Newtonian fluids. Values of the heat transfer coeff. ranged between 55.63 and 89.5 W/m^{1} C for particles heated in a non-Newtonian fluid and between 65.67 and 107.11 W/m^{2} C for particles heated in a Newtonian fluid. AS

2292

Dodeja (AK), Sarma (SC) and Abichandani (H). **Inactivation of proteases and lipase in milk in thin film scraped surface heat exchanger.** *Journal of Food Process Engineering* 13(3): 1990: 207-216

A cascade thin film scraped surface heat exchangers, having sterilizer, regenerator and cooler sections was designed and fabricated. It was employed for inactivation of thermostable proteases and lipases in milk. Buffalo milk was sterilized in

the temp. range: 143 - 152 C for holding times of 0.75, 1.0 and 1.25 s. Samples collected aseptically were stored at 37 C to study the proteolytic and lipolytic activities. The study established that activity of enzymes in milk subjected to higher temp. was far less than that of milk processed at lower temp. for same holding time. The effect of longer holding times was similar. AS

2293

Sastry (SK), Lima (M), Brim (J), Brunn (T) and Heskitt (BF). **Liquid-to-particle heat transfer during continuous tube flow: Influence of flow rate and particle to tube diameter ratio.** *Journal of Food Process Engineering* 13(3): 1990: 239-253

Liquid-to-particle convective heat transfer coeff. were measured during continuous flow through tubes, using an experimental technique in which a thermocouple was moved at the same speed as the particle. Water was used as the carrier fluid and transducer particles were made hollow to approximate densities of real food particles. Results from over 250 experimental runs over a fluid Reynolds number range from 7300 to 43600, showed that the convective coeff. was increased significantly with increasing fluid flow rate and particle to tube diameter ratio. Convective coeff. values ranged from 688 to 3005 w/m^2 C depending on the experimental conditions. Dimensionless correlations obtained between the Nusselt number, particle Reynolds number, particle to tube dia. ratio, and the particle Froude number yielded R^2 values ranging from 0.82 to 0.92 depending on the complexity of the relation. AS

2294

Pham (QT). **Shape factors for the freezing time of ellipses and ellipsoids.** *Journal of Food Engineering* 13(3): 1991: 159-170

By assuming that the freezing front is similar in shape to the surface, an expression is obtained for the shape factors of ellipses and ellipsoids. This expression agreed well with numerical results for the case of infinite Biot number but disagreed by up to 17% for intermediate Biot numbers. A curve-fitting expression is proposed that agrees with numerical results to within 6%. AS

2295

Paul Singh (S), Srivastava (AK) and Steffe (JF). **Vibration induced settling of a sphere in a Herschel-Bulkley fluid.** *Journal of Food Engineering* 13(3): 1991: 181-197

Settling of spheres suspended in a Herschel-Bulkley fluid with a yield stress under the influence of vibrations is of great practical significance while transporting liquid food systems such as soups, sauces and jams. A dimensionless equation has been developed to predict the settling time of a sphere in a Herschel-Bulkley fluid subjected to sinusodial vibration. The model was used to determine the effect of random vibrations as induced in a shipping environment. A separation criterion has been developed to determine whether a particle will settle. Methods described in this paper can also be used to characterize non-Newtonian fluids. AS

2296

Marcotte (M), Toupin (CJ) and Le Maguer (M). **Mass transfer in cellular tissues. Part I: The mathematical model.** *Journal of Food Engineering* 13(3): 1991: 199-220

The kinetics of equilibration of a biological structure with osmotic solutions were studied based on the internal cellular structure of the plant material. The model developed by Toupin was used to describe the mass transfer of sucrose and water in potato material. This model was modified to give a closer thermodynamical description of the forces involved in the osmotic process. The model was used to simulate movement of water and sucrose in potato tubers. The comparison between the simulations and the experimental data is presented in the second part of this paper. AS

2297

Oguntunde (AO) and Akintoye (OA). **Measurement and comparison of density, specific heat and viscosity of cow's milk and soymilk.** *Journal of Food Engineering* 13(3): 1991: 221-230

The proximate comp., density, specific heat and viscosity of various dilutions of cow's milk and soymilk produced from each of two local var. of soybeans (TGX 330-0102D and Doko) were determined at 25 C and subjected to regression analyses in order to determine the relationships between the percentage of total solids (%TS) and each of these primary physical properties. Density was found not to be significantly dependent on %TS or var. of soybeans whereas specific heat and viscosity were dependent. The relationship between specific heat and %TS was found to be linear and that between viscosity and %TS was found to be exponential for each of the 3 milk samples. Generally, at the same %TS, soymilk is denser and has greater specific heat and viscosity values than cow's milk. AS

2298

Fraser (AM) and Sawyer (CA). **Effectiveness of cold-serving units using two cold-holding methods in foodservice operations.** *Journal of Food Protection* 53(4): 1990: 336-340

Effectiveness of two cold-holding methods commonly used to maintain temp. of products held on cold-serving units (CSU) was determined by time-temp. and bacterial growth patterns of 3 products. Products used were bulk (2.27 kg) and portioned (100 g) cottage cheese, portioned (100 g) tuna salad, and deviled eggs halves (100 plus or minus 10 g). All the products were held on a cold serving unit using the mechanical/ice cold-holding method (mechanical cooling used in combination with 3 to 10 cm ice) for 24 h (control: lab. setting), as well as on 3 separate cold-serving units using the mechanical cold-holding method (at 3 university residence hall field sites under actual operating conditions) for 4 h (max. length of service). Temp. of all bulk and portioned products held on CSUs using the mechanical/ice cold-holding method (initial temp. of food were 4 to 8.2 C) were > 7.2 C after 2 h with a 50% load factor. When the mechanical and cold-holding method was used, all portioned products (initial temp. were 8.2 to 11 C) were <7.2 C after 2 h with a 75% load factor. Temp. differences between the mechanical and mechanical/ice cold-holding methods were attributed to ice on the cold-serving unit. The ice insulated the products from the mechanically cooled basin and allowed internal temp. of the products to increase. Statistical significance for bacterial growth patterns was reported only for products held on cold-serving units using the mechanical/ice cold-holding method: mesophilic growth in deviled eggs ($P < 0.05$) and psychrotrophic growth in tuna salad ($P < 0.0001$). As expected, bulk cottage cheese had a significanlty higher temp. over time ($P < 0.05$) than did portioned cottage cheese for both methods of cold-holding. Based on results of this study, portioned foods on cold-serving units should be held less than 2 h when mechanical/ice cold-holding method is used, or up to 4 h when the mechanical cold-holding method is available. AS

2299

Stoforos (NG). **On Ball's formula method for thermal process calculations.** *Journal of Food Process Engineering* 13(4): 1991: 255-268

Discrepancies between Ball's equation and his tabulated values associated with his original formula method for thermal process calculations had initially led to arguments for the validity of the equation and finally to revised sets of tables. Here, the validity of Ball's tables (within the accuracy of graphical integration) is established. A typographical error associated with Ball's published equation was identified and the correct form is presented. AS

2300

Ghazala (S), Ramaswamy (HS), Smith (J) and Simpson (B). **Thermal process time calculations for thin profile packages: Comparison of formula methods.** *Journal of Food Process Engineering* 13(4): 1991: 269-282

The process time calculation accuracy of 5 formula methods were evaluated in relation to predictions from a computer model based on finite difference numerical solution to 3-dimensional heat conduction equations with finite surface convection as applicable to processing of packaged foods in thin profile forms. Heat penetration data were obtained from the computer model for a range of package sizes, food properties and processing conditions. The centerpoint time-temp. data were used to calculate process times required for a target lethality of 5.0 min using the General method approach (employing numerical integration). This study indicated that process time prediction errors for the different methods calculated as percent deviations from those computed using the General method were relatively small (below 4% on av.) within the range of experimental conditions. AS

2301

Kalwar (MI), Kudra (T), Raghavan (GSV) and Majumdar (AS). **Drying of grains in a drafted two dimensional spouted bed.** *Journal of Food Process Engineering* 13(4): 1991: 321-332

A two-dimensional spouted bed with draft plates for grain drying was tested using soybean, wheat and corn. Drying rate and material temp. were measured as functions of the dryer geometry and operating parameters. The hypothesis of intermittent drying, consisting of a heating period in draft channel and a tempering period in the downcomer was verified. The drying rate was found to be related to the measured rate of solids circulation. For mathematical description of the drying process in the configuration investigated, the Page's equation for thin layer drying of grains was used. The two parameters in this model were correlated versus the bed geometry and the operating parameters of the spouted bed. AS

2302

Smith (EA) and Sokhansanj (S). **Moisture transport caused by natural convection in grain stores.** *Journal of Agricultural Engineering Research* 47(1): 1990: 23-34

Observations suggest that natural convection in grain stores produces moisture movement. The process is very slow but the moisture content of the grain can change enough during months of storage to influence the quality of the grain. The equations which describe this process are presented in this

paper. The fact that the movement of moisture is very slow is used to simplify the equations of heat and moisture transfer. The simplified equations have the same form as the equations used to describe heat transfer alone. Standard methods for solving heat transfer equations were used to solve the simplified equations. The method is shown to be reasonably accurate by comparing the results with experimental data. Also, the equations were used to simulate the movement of moisture in a grain bin where some data were recorded. Overall, the simulation was reasonably accurate; in particular it showed that the moisture was moved to the top-centre of the bin. But there was not enough information (such as weather data and packing density) to give a very accurate simulation. Earlier work suggests that heat is normally transported by convection in grain stores. In this paper, it is shown that natural convection can significantly affect heat transfer in the presence of moisture movement. This is achieved by using an approximate analysis of the heat and mass transfer equations which shows that conduction normally dominates the process. However, convection is important if the resistance to air flow is low enough and if the radius of the storage bin is approx. equal to the height of the bin. AS

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

2303

McCarthy (MJ), Heil (JR), Kruegermann (C) and Desvignes (D). **Acid requirement for pH modification of processed foods.** *Journal of Food Science* 56(4): 1991: 973-976

Amounts of acid required to lower the pH of acidified foods were calculated from titration curves produced by titrating the selected comminuted food with standardised acidulant sol. The pH of the foods at the end of titration remained within 0.8 pH units, the 95% confidence limit of reproducibility. Effective diffusivity (D_{eff}) of gluconic acid into a buffered model gel was 8.30×10^{-10} plus or minus $1.57 \times 10^{-10} m^2 sec^{-1}$. SRA

2304

Dreosti (IE). **Chemicals in food: Wanted and unwanted - the need for a balanced approach.** *Food Australia* 43(1): 1991: 10-11

Chemistry (Analytical)

2305

Reim (RE). **Total sulphite in cellulosics by ion exclusion chromatography with electrochemical detection.** *Journal of Food Science* 56(4): 1991: 1087-1090, 1094

2306

Guillou (C), Remaud (G) and Martin (GJ). **Application of deuterium NMR and isotopic analysis to the characterization of foods and beverages.** *Trends in Food Science and Technology* 2(4): 1991: 85-89

This review examines the applications of deuterium nuclear magnetic resonance (^2H NMR) spectroscopy and the mass-spectrometric detn. of ^{13}C contents in characterizing such molecules, detn. of origin of ethanols, detecting the chapatalization of wine and characterizing mixtures of alcohols, acetic acids, propionic acids and derivatives, and aromas and flavourings (vanillin, anethole, and benzaldehyde). 13 references. BV

FOOD MICROBIOLOGY AND HYGIENE

2307

Candlish (AAG). **Immunological methods in food microbiology.** *Food Microbiology* 8(1): 1991: 1-14

Microbial contamination of foods can now be determined using immunochemical methods based on the principle of antibody and antigen interaction. Assay methods in use include radioimmunoassay (RIA), enzyme linked immunosorbent assay (ELISA), affinity chromatography, immunofluorescence and agglutination. Such methods have been applied for the detection of microbial metabolites, e.g. mycotoxins which can now be determined at levels as low as a few p.p.b. (p.p.b. = $\mu g\ kg^{-1}$) to be present in a food sample such as peanuts in a matter of min. using immunological methods. Bacterial enterotoxins have long been detected in foods using immunoassays; however, recent results of new technologies have allowed for the routine analysis of suspected contaminated foods using simple methods. The presence of viable bacteria such as *Salmonella* in foods has previously only been achievable after isolation of the bacterium. Now, however, with the advent of more specific and sensitive methods such as the sandwich ELISA and latex agglutination, it is possible to establish the presence or absence of these pathogenic bacteria from a mixed broth culture of the food sample several days prior to traditional testing methods.

Thus, when compared with conventional methods immunoassays offer similar detection limits and confidence levels. Furthermore, they simplify sample preparation procedures in relation to extraction of metabolites and growth of microorganisms. AS

Enzymes

2308
Whitaker (JR). **Enzymes: monitors of food stability and quality.** *Trends in Food Science and Technology* 2(4): 1991: 94-97

Review. 26 references. BV

2309
Pasqual (MS), Carrau (JL), Serafini (LA) and Dillon (AJP). **A simple method to detect killer yeasts in industrial systems.** *Journal of Fermentation and Bioengineering* 70(3): 1990: 180-181

2310
Ducastaing (A) and Adrian (J). **Enzymes in food technology.** *Sciences Des Aliments* 10(2): 1990: 231-254 (Fr)

This report examines some of the present and future possible uses of enzymes in the food industry and gives some examples of new molecules which can be produced by enzymatic methods. BV

Ethyl alcohol

2311
Cuesta (MA) and Cornejo (I). **Selection of *Candida pseudotropicalis* strains for ethanol production by mutagenesis. III. Adaptation of yeast to high lactose and ethanol concentration.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 371-376

Mutants of *Candida psudotropicalis* with increased tolerance to ethanol and lactose have been isolated by a training method that involves 14 or 17 successive transfers. The use of this procedure permitted the selection of strains which were viable in presence of 14% (v/v) ethanol and fermented concentrated whey (20% lactose) with higher yields (about 90% of theoretical) and higher production of ethanol 1.3% (v/v) more than the wild type culture. AS

Fermentation

2312
Schlicher (LR) and Cheryan (M). **Reverse osmosis of lactic acid fermentation broths.** *Journal of Chemical Technology and Biotechnology* 49(2): 1990: 129-140

Lactic acid model solutions and fermentation broths were concentrated using a tubular thin-film composite reverse osmosis membrane. Flux increased linearly with applied transmembrane pressure and was relatively unaffected by flow rate. Osmotic pressures of 1% lactate solutions were 280-560 kPa; depending on the pH or degree of dissociation. Rejections increased with applied pressure. Higher pH caused a slight decrease in flux (due in part to the higher osmotic pressure) and a significant increase in rejection. Above pH 5.6, rejections of lactate and residual sugars were > 97%. In contrast, with cellulose acetate membranes, flux was generally lower and lactate rejection was proportional to the degree of dissociation of lower pressures. AS

Microorganisms

2313
Salzer (U-J). **Microbiological quality control of flavours.** *Perfumer and Flavourist* 15(5): 1990: 17-18

Microorganisms which may occur in food, flavourings and flavour ingredients with spoilage potential from microorganisms, hygienic methods of manufacturing flavours, and legal and other microbiological requirements are highlighted in this article. BV

Bacteria

2314
Owusu (RK), Makhzoum (A) and Knapp (J). **The thermodynamic stability of lipase and proteases from psychrotrophic bacteria.** *Food Chemistry* 39(2): 1991: 187-195

The thermodynamic or conformational stability of psychrotroph lipases and proteases, measured as the Gibbs free energy difference ($\delta G\theta'$) between the native and denatured enzymes, were estimated from enzyme temp.-activity profile data. $\delta G\theta$ estimates of 8 - 10 kJ/mol and 16 - 17 kJ/mol were obtained for psychrotroph-derived lipases and proteases, resp. *Pseudomonas fluorescens* strain AR-11 protease was unusually thermolabile ($\delta G\ \theta$ = 3.0 - 7.6 kJ/mol). These values were compared with values for some mesophilic and thermophilic enzymes and the possible relationship of $\delta G\ \tau$ to psychrotrophic enzyme heat-resistance is discussed. AS

Bacillus licheniformis

2315

Ramesh (MV) and Lonsane (BK). **Characteristics and novel features of thermostable** α-amylase produced by ***Bacillus licheniformis* M27 under solid state fermentation.** *Starch/Starke* 42(6): 1990: 233-238

The purified α-amylase from *Bacillus licheniformis* M27, produced under solid state fermentation technique, showed novel characteristics as compared to those reported by other workers for the purified α-amylases from *B. licheniformis* obtained by submerged fermentation process. Some of the novel features of the characteristics of the enzyme from *B. licheniformis* M27 include two peaks for pH optima at 6.5 - 7.0 and 8.5 - 9.0, gradual loss of activity to about 86% between pH 7.0 - 7.5 followed by rise to full activity between 7.5 - 8.5, temp. optimum at 85 - 90 C at pH 7.0 and 9.0, sharp fall in stability at acidic pH values and the thermostability response which is more similar to the enzyme from other species of *Bacillus*. The mol. wt. of the enzyme was found to be 19,500 plus or minus 500 and 56,000 plus or minus 2,000 when determined by gel filtration and SDS PAGE, resp. The activation energy is 20.4 times lower than that reported for the enzyme from another strain of *B. licheniformis*. It also showed differences in the contents of amino acids such as serine, proline and methionine. AS

Enterococcus

2316

Huhtanen (CN). **Gamma-radiation inactivation of *Enterococci*.** *Journal of Food Protection* 53(4): 1990: 302-305

Radiation survival curves were determined for 7 strains of *Enterococcus faecium*, 10 strains of *E.faecalis*, and 8 strains of the proteolytic var. of *E. faecalis*. The D values (i.e. the doses giving 90% reduction of viable counts) ranged from 5.0 - 47 kGy for the *E. faecium* strains, 3.5 - 21 kGy for the *E. faecalis* strains, and 3.0 - 4.5 kGy for the proteolytic variants of *E. faecalis*. The survival curves were linear for most strains but some exhibited significant non-linear trends. AS

Lactobacillus kefiranofaciens

2317

Mukai (T), Watanabe (N), Toba (T), Itoh (T) and Adachi (S). **Gel-forming characteristics and rheological properties of kefiran.** *Journal of Food Science* 56(4): 1991: 1017-1018, 1026

Kefiran (a water soluble polysaccharide produced by *Lactobacillus kefiranofaciens*, 3%) formed gel in the presence of ethanol (4-10%). The gel strength in 8% ethanol was comparable to that of 3% gelatin gel in water. Addition of casein (3%) increased gel strength 1.5 - 2.0 fold. The unique properties of *Kefiran* may make it a useful food additive. SRA

Lactococcus lactis

2318

Kim (JH) and Batt (CA). **Molecular characterization of a *Lactococcus lactis* bacteriophage F4-1.** *Food Microbiology* 8(1): 1991: 15-26

The genome of a bacteriophage that infects *Lactococcus lactis* F4-1 has been characterized and a region coding for several structural proteins cloned. *L. lactis* bacteriophage F4-1 is a small isometric bacteriophage with a genome of approx. 33 kilobases (kb) and complementary single-stranded ends. It has a brust size of 120 and a latent time of approx. 30 min. A 7.6-kb HindIII/EcoRI fragment has been cloned into *E. coli* and shown to code for the major capsid protein and at least four other proteins between 35 and 43 kDa. The region coding for these proteins lies on the right arm of the genome within 9 kb of the right cos site. Although the major capsid protein appears prominently in Coomassie blue stained SDS-PAGE preparation of *L. lactis* bacteriophage F4-1 the other proteins appear to be minor components of the bacteriophage capsid. A 3-kb Sau3A fragment coding for the 35- and 43-kDa proteins was subcloned into both *E. coli* and *L. lactis* LM0230. Both proteins were expressed in either host presumably via their own promoter. AS

2319

Kim (JH) and Batt (CA). **Nucleotide sequence and deletion analysis of a gene coding for a structural protein of *Lactococcus lactis* bacteriophage F4-1.** *Food Microbiology* 8(1): 1991: 27-36

The nucleotide sequence has been determined for a region of the *Lactococcus lactis* bacteriophage F4-1 genome which codes for a var. of structural proteins. The 3044-base pairs (bp) fragment contains four open reading frames for proteins from 43 to 9.5 kDa. Each open reading frame is preceded by a putative ribosome binding site and sequences homologous to the *E. coli* -35 and -10 consensus promoter sequences. The two largest open reading frames code for a 43- and 35-kDa protein, the open reading

frames overlap in the same reading frame and share the translational termination codon. These two proteins have been observed in Western bolts and *in vitro* transcription/translation analysis of both *E. coli* and *L. lactis* LM0230 carrying the cloned bacteriophage sequence. Deletion analysis of the 5' and 3' ends confirms the positions of the open reading frames corresponding to the 43- and 35-kDa proteins and suggests that each open reading frame can be transcribed by its own promoter. Putative -35 and -10 regions have been identified by scanning the nucleotide sequence and their position corresponds to the results from deletion analysis. AS

Listeria

2320
Gahan (CGM) and Collins (JK). **Listeriosis: Biology and implications for the food industry.** *Trends in Food Science and Technology* 2(4): 1991: 89-93

This review covers isolation of *Listeria monocytogenes*, listeriosis, *L. monocytogenes* in the environment, *L. monocytogenes* in foods (incidence, effects of processing and prevention of foodborne listeriosis. 31 references. BV

Listeria monocytogenes

2321
El-Kest (SE), Yousef (AE) and Marth (EH). **Fate of *Listeria monocytogenes* during freezing and frozen storage.** *Journal of Food Science* 56(4): 1991: 1068-1071

2322
Smith (JL), McColgan (C) and Marmer (BS). **Growth temperature and action of lysozyme on *Listeria monocytogenes*.** *Journal of Food Science* 56(4): 1991: 1101, 1103

2323
Cox (LJ), Siebenga (A), Pedrazzini (C) and Moreton (J). **Enhanced haemolysis agar (EHA) - an improved selective and differential medium for isolation of *Listeria monocytogenes*.** *Food Microbiology* 8(1): 1991: 37-49

Enhanced Haemolysis Agar (EHA) medium has been developed for the selective isolation of *Listeria monocytogenes* from food enrichments. It is based on the selective agents of the Oxford medium , with the addition of sheep blood (5%), 4-methylumbelliferyl-β-D-glucoside (50 mgl^{-1}) and sphingomyelinase (10 $units/l^{-1}$). The medium contains no esculin or ferric citrate and the lithium chloride concn. is reduced to 1%. *L. monocytogenes* colonies are distinguished by their light blue fluorescence and yellow centre (in UV 366nm), colony morphology and the presence of a distinct zone of haemolysis around the colony, indicating the production of the camp factor. Listeria innocua does not produce haemolysis on this medium and therefore cannot be confused with *L. monocytogenes*. Haemolysis positive *Listeria seeligeri*, although found relatively rarely in foods, can be distinguished by performing a xylose fermentation test after isolation on EHA. Strains of *Listeria ivanovii* from the collection failed to grow on this medium. Although haemolysis-negative and CAMP-negative *L. monocytogenes* may not be detected by this medium, their apparent lack of pathogenicity makes them of limited interest to food microbiologists. AS

2324
Cox (LJ), Siebenga (A) and Pedrazzini (C). **Performance of enhanced haemolysis agar compared to Oxford medium for the isolation of *Listeria monocytogenes* from food enrichment broths.** *Food Microbiology* 8(1): 1991: 51-62

Combinations of tryptone soya broth plus yeast extract trypaflavine and nalidixic acid (TSByeAB), a modified Listeria enrichment broth (MLEB), Oxford medium and Enhanced Haemolysis Agar (EHA) were used to analyse 99 food samples from supermarkets in continental Europe. A total of 48 samples were positive for *Listeria* spp. using all combinations of enrichment broth, enrichment time and isolation medium. TSByeAB enrichments tended to result in loss of detection of positives over 48 h enrichment, whereas MLEB showed an improved detection. Oxford medium detected 33 (68.7%) of the 48 *Listeria* spp. positive samples, compared to 46 (95.8%) of the 48 detected by EHA. *Listeria monocytogenes* was detected in 36 of the 48 samples, 16 (41.6%) being detected on Oxford medium compared to 35 (97%) on EHA. Similar tendencies were observed for both isolation media irrespective of the broth/time combinations. *Listeria innocua* and *L. monocytogenes* were detected together on the same plate. This occurred 13 times on EHA but only once on Oxford medium. In 8 of the 16 cases, *L. innocua* or nothing was detected on the Oxford plate when EHA was positive for both organisms. On only one occassion was Oxford medium positive for both organisms when *L. innocua* or nothing was present on the EHA plate. These results show EHA to have advantages for both the isolation of *Listeria* spp. and the discrimination between haemolytic and non-haemolytic species of this genus. AS

2325

Palumbo (SA) and Williams (AC). **Resistance of *Listeria monocytogenes* of freezing in foods.** *Food Microbiology* 8(1): 1991: 63-68

The ability of *L. monocytogenes* to survive freezing and frozen storage at -18 C was studied in ground beef, ground turkey, frankfurters, canned corn, ice-cream mix, and tomato soup. Injury of *L. monocytogenes* as a result of freezing and frozen storage, as well as the ability of various *Listeria*-selective media to quantitatively recover the organism after freezing was also investigated. The responses of the organism, i.e. survival injury, and quantitative on selective media, were related to the pH (acidity) of the food. Five of the examined foods had pH values of 5.8 or obove, while tomato soup had a pH of 4.74 *L. monocytogenes* survived freezing and frozen storage well in five of the examined foods, was not injured, and was quantitatively recovered on *Listeria*-selective media. In contrast, the organism showed a decline in viable count after extended frozen storage in tomato soup, was injured, and could not be quantitatively recovered on *Listeria*-selective media. These results indicate that for most foods, freezing prior to analysis for *L. monocytogenes* should not hamper quantitative detn. of the organism. AS

2326

Lee (S-H) and Frank (JF). **Effect of growth temperature and media on inactivation of *Listeria monocytogenes* by chlorine.** *Journal of Food Safety* 11(2): 1991: 65-71

The effect of growth environment on the susceptibility of *L. monocytogenes* to inactivation by hypochlorite is reported. The cells were grown in tryptic soy broth (TSB) at 35, 21 and 6 C and in 1:15 dilution of TSB at 35 C. Late exponential phase cells were harvested, washed and exposed to 1 p.p.m. sodium hypochlorite solution for 5 min. The results of exp. revealed that growth environment has a significant effect on chlorine inactivation of *L. monocytogenes*. KMA

2327

Smith (JL) and Marmer (BS). **Temperature shift effects on injury and death in *Listeria monocytogenes* Scott A.** *Journal of Food Safety* 11(2): 1991: 73-80

Exposure of *L. monocytogenes* Scott A grown at 37 C to a 1 h heat treatment at 52 C resulted in little death of cells. However as the temp. of growth decreased there was an increase in the extent of death. Heat induced injury however decreased as the growth temp. decreased. The data obtained here suggest that of foods containing *L. monocytogenes* are temp. abused for even short periods, the organisms will acquire an increased way tolerance and will require inactivation temp. KMA

2328

Kelen (DVD) and Lindsay (JA). **Isolation, purification and partial characterization of a new extracellular cytotoxin from a virulent chemical strain of *Listeria monocyotgenes* serotype 4 b, and an avirulent, nonhemolytic .variant ATCC 15313 serotype 1/2a.** *Journal of Food Safety* 11(2): 1991: 81-98

Studies revealed that both virulent ((4b) and avirulent ATCC 15313) strains of *L. monocytogenes* synthesises a unrecognized extracellular cytotoxin of M, 34,000. The cytotoxin as thermostable as the absence of viable *L. monocytogenes* cells in a food does not prelude the possibility of a toxigenic food product. KMA

Pseudomonas stutzeri

2329

Woo (G-J) and McCord (JD). **Maltotetraose production using *Pseudomonas stutzeri* exo-α-amylase in a membrane recycle bioreactor.** *Journal of Food Science* 56(4): 1991: 1019-1023, 1033

Fungi

2330

Depasquale (DA), El-Nabarawy (A), Rosen (JD) and Montville (TJ). **Ammonium bicarbonate inhibition of mycotoxigenic fungi and spoilage yeasts.** *Journal of Food Protection* 53(4): 1990: 324-328

Sodium bicarbonate inhibits growth and aflatoxin production by *Aspergillus parasiticus*. This survey determined that other mycotoxigenic fungi were also sensitive to bicarbonates. Sodium bicarbonate, potassium bicarbonate, ammonium bicarbonate, ammonium sulphate and sodium chloride were added to buffered or unbuffered potato-dextrose agar to determine the bicarbonate effect on growth and morphology of six mycotoxigenic fungi. Three nonmycotoxigenic fungi and four yeast sp. were also examined. Ammonium bicarbonate at 0.11M completely inhibited the growth of *Fusarium tricinctum* NRRL 13442, *F. tricinctum* NRRL 13426, *F. graminearum* NRRL 5883, *F. sporotrichioides* NRRL 3249, *Penicillium griseofulvum* NRRL 989, *Aspergillus ochraceus* NRRL 3174, *A. flavus* NRRL 1957, *A. niger*, and *P. notatum*. Sodium chloride and pH elevated through the use of ampso-NaOH, capso-NaOH, or glycine-NaOH buffer did not display

an inhibitory effect on the filamentous fungi examined. Buffered ammonium sulphate treatments (pH approx. 9.0) completely inhibited all of the mycotoxigenic fungi, but at pH 5.6, ammonium sulphate treatments were not inhibitory. Sodium bicarbonate (0.11M) was effective only against *P. griseofulvum*, *A. flavus* NRRL 1957, *A. niger*, and *P. notatum*, causing viability reductions of 5.6, 3.7 4.9 and 2.9 log cycles, resp. Potassium bicarbonate was generally as inhibitory as the sodium salt. In contrast, elevated pH, alone, appeared to account for the > 6 log reduction observed for the yeasts *Lipomyces starkeyi*, *Geotrichum candidum*, *Kluyveromyces marxianus* and *Debaryomyces hansenii*. AS

Asperigullus oryzae

2331

Penel (AJ) and Kosikowski (FV). b-**nitropropionic acid production by *Aspergillus oryzae* in selected high protein and carbohydrate-rich foods.** *Journal of Food Protection* 53(4): 1990: 321-323

Aspergillus oryzae (ATCC, 12892) was studied for its stability to produce β-Nitropropionic acid (BNP) in selected high protein and carbohydrate-rich foods. Portions of 35 g of white potato, yellow sweet potato, ripe banana, freshly made Indonesian tempeh, and Cheddar cheeses loosely packed in petri dishes were inoculated with a spore suspension of *A. oryzae*. In Blue and Camembert cheese samples, the test organism was added along with the penicillium molds during manufacture. Ten imported mold-ripened cheeses obtained from a retail outlet in New York City were also tested. All food specimen were assayed for BNP. The *Aspergillus* contaminant did not produce BNP in Camembert and Blue cheeses: but in Cheddar, production occurred when mold contaminated cheese was maintained at approx. room temp. Indonesian tempeh provided a poor substrate for the production of this mold toxin, but *A. oryzae* flourished on cooked sweet potato, white potato and ripe banana and produced BNP. Synthesis in yellow sweet potato was significantly less than in the other carbohydrates. AS

Mushrooms

2332

Sathe (AV) and Sangita Dighe. **Adverse effect of microbial pollutants of paddy straw on the growth of paddy straw mushroom.** *Journal of Food Science and Technology (India)* 28(4): 1991: 252

In the present study, out of the 5 pollutant microorganisms tested, two namely *Pseudomonas aeruginosa* and *Bacillus subtilis* were seen to exert the inhibitory effect over the culture of *Volvariella volvacea* which may be the cause of the variation in the yields of paddy straw mushroom during its commercial cultivation and it could be counteracted by maintaining proper hygiene of the mushroom beds. AS

Pleurotus

2333

Mukta Singh (S), Verma (RN) and Bilgrami (KS). **Nutritional and toxicological evaluation of *Pleurotus* spp.** *Journal of Food Science and Technology (India)* 28(4): 1991: 259-260

Two wild mushrooms viz. *Pleurotus djamor* and *P. platypus* collected from North Eastern Hill regions of (NEH) India and cultivated on paddy straw, were analysed for their proximate comp. and tested for their edibility. The sporophores of *P. djamor* and *P. platypus* contained 14.10 and 16.86% crude protein and 2.75 and 2.59% crude fat resp. Feeding the dry powder of the sporophores as supplement to Swiss albino mice led to a significantly higher body wt. in case of *P. platypus*. However, no toxic effect of the test fungi either on the morphology or histology of the vital organs of the animals were noticed. AS

Yeasts

2334

Bellinger (Y), Lemarchal (P) and Larher (F). **Relations between the salt tolerance of *Saccharomyces cerevisiae* and the efficiency of glucose conversion into biomass, glycerol and lipids.** *Sciences Des Aliments* 10(3): 1990: 679-695 (Fr)

Saccharomyces cerevisiae

2335

Matsutani (K), Fukuda (Y), Murata (K), Kimura (A), Nakamura (I), Yajima (N). **Physical and biochemical properties of freeze-tolerant mutants of yeast *Saccharomyces cerevisiae*.** *Journal of Fermentation and Bioengineering* 70(4): 1990: 275-276

Freeze-tolerant mutants of a yeast *Saccharomyces cerevisiae* were obtained through repeated mutations. The freeze-tolerance of the yeast cells was thought to be partially induced by the increasing rigidity of the cell surface, although the tolerance altered the susceptibility of the yeast cells to some toxic chemicals. AS

Schizosaccharomyces pombe

2338

Bonilla (AR) and Rand (AG). **Alginate and carrageenan immobilization effects on *Schizosaccharomyces pombe* activity and stability.** *Journal of Food Science* 56(4): 1991: 1095-1096

Hygiene

2337

Corlett (DAJr). **Monitoring a HACCP system.** *Cereal Foods World* 36(1): 1991; 33-40

This article provides the rationale and information needed to develop reliable monitoring procedures necessary for HACCP (hazard analysis and critical control point) food safety programs, continuous inspection and spot checks, attribute sampling (microbiological criteria, two-class attributes sampling plans, three-class attributes sampling plans and sampling plans and limits) and limitations of attribute sampling procedures. BV

BIOTECHNOLOGY

2338

Salazar (M) and Chamorro (G). **Study of lethal dominant of *Spirulina maxima* in male rats.** *Sciences Des Aliments* 10(3): 1990: 713-718

This study reports the evaluation of the dominant lethal potential of *Spirulina* in male rats in an investigation in which the compound was administered in the diet for upto 10 wks. All animals appeared healthy and active throughout the test and did not produce dominant lethal mutations in the germinal cells of male rat. The absence of untoward effects in rats fed high levels of *Spirulina* is in agreement with the results of previous toxicological studies. BV

2339

Nakajima (N), Conrad (D), Sumi (H), Suzuki (K), Easki (N), Wandrey (C), Soda (K). **Continuous conversion to optically pure L-methionine from D-enantiomer contaminated preparations by an immobilized enzyme membrane reactor.** *Journal of Fermentation and Bioengineering* 70(5): 1990: 322-325

Continuous conversion to optically pure L-methionine from preparations contaminated by a small amount of the D-enantiomer (0.5 - 1.0%) has been developed with an enzyme membrane reactor system (slurry reactor) containing immobilized D-amino acid oxidase, catalase, and FAD. The optimal pH of the reaction system was from pH 7.0 - 8.0, and the optimum temp. was 25 C. The av. conversion and the space-time yield were > 99% > and mearly 90 g/l.d, resp. with operation of the reactor for 7 days. AS

2340

Chithra (N) and Baradarajan (A). **Mathematical analysis of the performer of a packed-bed co-immobilized bioreactor.** *Journal of Chemical Technology and Biotechnology* 49(2): 1990; 115-127

A model has been developed to describe the performance of a packed-bed coimmobilized biochemical reactor. Each step in the consecutive reaction is assumed to follow Michaelis-Menten type kinetics. The model includes all the limiting steps controlling the rate of reaction and the additional effect of axial dispersion of bulk liquid. The model equations are solved by the explicit finite difference method from the tansient to steady-state condition. The effects of various parameters of physical importance on the reactor performance are discussed. AS

2341

Marcotte (M) and Le Maguer (M). **Repartition of water in plant tissues subjected to osmotic processes.** *Journal of Food Process Engineering* 13(4): 1991; 297-320

TISSUE CULTURE

Nil

FOOD ADDITIVES

Stabilizers

Gums

2342

Dziezak (JD). **A focus on gums.** *Food Technology* 45(3): 1991: 116, 118-120, 122-124, 126, 128, 130-132

This report focusses on food gums extracted from plant materials (seaweed extracts (alginates, agar and carrageenan), seed gums (locust bean gum and guar gum), exudate gums (gum arabic, gum ghatti, gum karaya and gum tragacanth), microbial gums (xanthan gum and gellan gum)), chemically modified plant material (cellulose derivatives and pectin) and

the selection and use of gums. The review concludes with a aspect on its application (bakery products, bakery fillings and toppings reformed and restructured meats and salad dressings). 26 references. CSA

Sweeteners

2343

Whitelaw (ML) and Daniel (JR). **Synthesis and sensory evaluation of ring-substituted dihydro-chalcone sweeteners.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 44-51

A series of hesperetin dihydrochalcones, containing electron-donating or -withdrawing substituents para to the proposed hydrogen-bonding AH sites of each aromatic ring, have been synthesized. These novel compounds were evaluated for both total taste potency and percentage sweetness by a trained taste panel. The most potent dihydrochalcone sweetener currently known, 3'-carboxyhesperetin dihydrochalcone (3400 times more potent than 6% w/v sucrose), was synthesized. The characteristic lingering aftertaste of dihydrochalcones remained unimproved by these chemical modifications. AS

2344

King (GAIII), Sweeny (JG) and Iacobucci (GA). **New high-potency L-aspartyl-3-bicycloalkyl-L-alanine methyl ester sweeteners.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 52-56

A new series of high-intensity sweeteners was prepared in which the phenyl ring of aspartame is replaced by a substituted bicycloalkyl unit. In the case of the L-aspartyl-3-(2-norbornyl)-L-alanine methyl esters, methyl substitution of the norbornyl ring increased sweetness potency except in the case of the 1,3,3-trimethylnorbornyl analogue, where a great reduction was found. The two sweetest compounds prepared were the 1,7,-trimethylnorbernyl and the 7,7-dimethylnorbornyl analogues. For these compounds, the four possible ring stereoisomers were synthesized, and in each case only the 2R-exo and 2R-endo isomers were intensely sweet. AS

Aspatame

2345

Boesten (WHJ), Dassen (BHN), Kleinjans (JCS), van Agen (B), wan der Wal (S), de Vries (NK), Schoemaker (HE), Meijer (EM). **N-formylcarbamoylaspartame, a new aspartame-like sweetener. Synthesis and studies on stability and biological properties.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 154-158

A new aspartame-like sweetener, N-formylcarbamoylaspartame (FC-APM), was efficiently prepared from aspartame (APM). Due to the N-protective group, FC-APM is less prone to diketopiperazine formation and therefore much more stable than aspartame at higher pH values (6-9) and temp. (60 - 80 C). *In vitro* biotransformation experiments in tissue fractions of the rat gastrointestinal tract showed that FC-APM is less efficiently metabolized compared to APM. A relatively stable metabolite of FC-APM was isolated from tissue extracts by preparative HPLC and identified by ^{13}C NMR as the demethylated product of FC-APM. FC-APM did not show mutagenic activity in the *Salmonella* microsome assay either with or without metabolic activation. In the Sister Chromatid Exchange (SCE) test, FC-APM did increase human lymphocyte SCE frequency significantly but not dose dependently, while application of a metabolite system prevented these chromosome-damaging effects. AS

Thickeners

Konjac flour

2346

Tye (RJ). **Konjac flour: Properties and applications.** *Food Technology* 45(3): 1991: 82, 84, 86, 88, 90, 92

This article covers properties and features (water thickening, formation of thermally stable gels, synergism with kappa carageenan, synergism with xanthan gum, film formation and interactions between konjac flour and starch) of konjac flour. The use of konjac flour as a stabilizer or gelling agent in a var. of existing and potential food applications (reduced fat foods, sausage-like products, reduced-fat condiments, and pasta products) and current demands are also covered. CSA

CEREALS

2347

Cura (JA) and Krisman (CR). **Cereal grains: A study of their α-1, 4-α-1, 6 glucopolysaccharide composition.** *Starch/Starke* 42(5): 1990: 171-175

The glucopolysaccharides containing α-1, 4 and α-1, 6 linkages present in the endosperm of mature cereal seeds (corn, wheat and rice) were fractionated according to their branching degree. An already published method was used to specifically estimate the α-1, 6 linked glucoses involved in the branching points. The following features were found. a)

Starches from different tissues vary in their relative amount of amylose and amylopectin. b) Amylose is present either as a strictly linear or additionally as a lowly branched polysaccharide. c) Amylopectins with a rather wide range of branching degrees were detected. A redefinition of the starch α-1, 4-α-1, 6 glucopolysaccharides based on their λ_{max} and percentages of glucoses in branching points was introduced. A linear correspondence between branching points and the max. absorption (λ_{max}) in the presence of *Krisman's* iodine reagent was obtained. AS

2348

Stauffer (JE). **Quality assurance in cereal plants.** *Cereal Foods World* 36(1): 1991: 11-23, 26

Aspects covered in this article include: quality assurance vs quality control, raw material specifications, test methods, food additives and GRAS substances, unavoidable contaminants, hazard analysis and critical control points, hazards of breakfast cereals (extraction matter, filth, molds and mycotoxins and other hazards), critical control points (RTE cereal flakes, RTE cereal and cooking grits vs extruding pellets), controlling extrusion, statistical quality control, good manufacturing practice, sanitation, pest control, shelf life and warehousing and shipping. BV

2349

Leloup (VM), Colonna (P) and Buleon (A). **Influence of amylose-amylopectin ratio on gel properties.** *Journal of Cereal Science* 13(1): 1991: 1-13

The aim of this work was to study the structural features of aqueous starch gels as a function of their amylose:amylopectin ratio, r. Structural characteristics of amylose-amylopectin gels were studied using uniaxial compression measurements, mild acid hydrolysis, α-amylolysis, X-ray diffractometry and hot water solubility. Two families of gels were isolated according to the amylose:amylopectin ratio (r). Mixed gels had similar behaviour either to pure amylopectin gels for $r < 0.43$ or to pure amylose gel for higher values of r. Amylopectin-rich gels were fairly well degraded both chemically (60 to 100%) and enzymically (-50%), but had poor mechanical properties and solubility behaviour. Amylose-rich gels however were slightly degraded (-20% in all cases), but exhibited good mechanical and thermal resistances. Results were explained in terms of supra-molecular organization, suggesting a phase-separated structure with a continuous matrix of one polymer embedding microdomains of the second polymer. Polymer comp. of each phase was determined by the ratio r, and the particular value of $r = 0.43$ was interpreted as the inversion point between the two types of gel. AS

Barley

2350

McDonald (AML), Stark (JR), Morrison (WR) and Ellis (RP). **The composition of starch granules from developing barley genotypes.** *Journal of Cereal Science* 13(1): 1991: 93-112

Starch, N and P were assayed in samples from isogenic lines - Glacier (normal) CI9676, Glacier (high amylose) Ac 38, Oderbrucker (normal) and Waxy Oderbrucker (low amylose) - which were harvested at intervals from 14 days after anthesis (DAA) to grain maturity. Quantitative detn. of the size distribution of the starch granules was carried out using a Counter with 100-channel analyzer and the number of A- and B-granules per endosperm calculated. Large and small starch granules were separated by differential sedimentation in water. In each of the 4 lines there was a different linear relationship between the increasing amylose content and the increasing P content of the large granules during grain development. Small amounts of amylose were found in the large A-granules of the var. Waxy Oderbrucker, but none was detected in the small B-granules. It was concluded that the data for non-waxy A-granule starches were compatible with a model in which there is a core of low-amylose low-lipid starch. The comp. of the starch in the B-granules differed from that in the A-granules throughout development. AS

2351

Komolprasert (V) and Ofoli (RY). **Barley b-amylase hydrolysis of starch during twin screw extrusion.** *Journal of Food Process Engineering* 13(4): 1991: 283-295

Effect of moisture content, screw r.p.m. and β-amylase dose on the rate of maltose production in a Baker-Perkins twin screw food extruder has been studied. Fifteen experiments were conducted using a fixed screw configuration at a fixed mass flow rate of 15 kg/h, under isothermal conditions (t = 57 C) and a pH of 5.5. Each of the 3 variables was found to have a significant effect ($P < 0.05$) on maltose production. Using response surface regression analysis on the experimental data, a quadratic objective function was derived. The function was optimized, subjecting it to three explicit boundary conditions, using the adaptive complex method. The optimization process yielded a max. maltose

production of 34% and 54% moisture content, 30 r.p.m. screw speed and 157 units of enzyme/g of starch. The extent of saccharification was about 30%. AS

Rice

2352

Ito (K), Yoshida (K), Ishikawa (T) and Kobayashi (S). **Volatile compounds produced by the fungus *Aspergillus oryzae* in rice *Koji* and their changes during cultivation.** *Journal of Fermentation and Bioengineering* 70(3): 1990: 169-172

The volatile compounds produced by growing the fungus *Aspergillus oryzae* on steamed rice, during *Koji* making, were collected with a Tenax-TA column and analyzed by GC and GC-MS. Eight kinds of alcohols, 3 kinds of aldehydes, 5 kinds of ketones, and an ester were identified. The production of volatile compounds was affected by the oxygen concn. Alcohols and aldehydes were especially increased by a deficiency of oxygen. The production of volatile compounds was max. at the middle stage of growth and decreased thereafter. The results of semicontinuous analysis of mycelial growth and the production of volatile compounds showed that the tendency of the almost volatile compounds corresponded better with the mycelial growth rate than the mycelial wt. The tendency of 1-octen-3-ol was different from other volatile compounds: it increased with the cultivation time and didn't decrease. AS

2353

Murugesan (G) and Bhattacharya (KR). **Basis for varietal difference in popping expansion of rice.** *Journal of Cereal Science* 13(1): 1991: 71-83

Twenty-five var. of paddy differing widely in their popping expansion were analysed for their chem. and physical characteristics. Non-starchy polysaccharides (tested in 10 var.), amylose and protein; grain length, thickness and wt.; husk-to-kernel gap; and thickness of pericarp and aleurone layer (in 10 var.) were unrelated to popping expansion. Tightness of husk (lemma-palea) interlocking and grain hardness were strongly positively correlated with popping and 'white belly' (grains containing opaque, chalky regions) was negatively correlated. Multiple correlation analysis showed that these three factors could explain 80% of the variation in popping expansion among the variations; these factors along with the content and thickness of husk, equilibrium moisture of paddy, and cracked grains together explained over 95% of the variation. Grain breadth was positively correlated to white belly and thus indirectly affected popping inversely. AS

2354

Murugesan (G) and Bhattacharya (KR). **Effect of some pretreatments on popping expansion of rice.** *Journal of Cereal Science* 13(1): 1991: 85-92

Pre-drying of paddy (var. Intan) to 9% moisture before finally adjusting it to the optimum moisture of 14% greatly improved its popping expansion. This benefit seemed to originate from improved lemma-palea interlocking and greater grain hardness brought about during pre-drying. Soaking paddy in 2% NaCl solution increased its popping expansion appreciably, but pre-drying it did not further improve popping. Superficial application of salt solution suppressed popping. Soaking paddy in water drastically lowered its popping expansion, apparently due to loosened husk interlocking and a softened endosperm; pre-drying of water-soaked paddy could not restore subsequent expansion. Hence pre-drying is recommended in the production system of popped rice. Soaking in salt solution seems less practical and wetting of paddy is to be avoided. Cracks in rice did not seem to affect popping. AS

2355

Hsieh (F), Fields (ML), Li (Y) and Huff (HE). **Ultra-high temperature effect of *B. stearothermophilus* during puffing of rice.** *Journal of Food Quality* 12(5): 1989: 345-354

Destruction, damage and activation of thermophilic bacterial spores of *Bacillus stearothermophilus* at ultra-high heating temp. (170 to 210 C) were studied using a rice cake machine as a model system. Activation of spores at ultra-high temp. was observed after 99.9% of the original spores were killed ($P < 0.05$). Significant difference ($P < 0.01$) in spore counts was found when a rich protein medium and a minimal nutritious medium were used simultaneously to recover spores after heating. This indicated that heat damage did occur and that amino acids were required to repair the damage. AS

2356

Nag (PK), Pal (PK), Das (MK) and Bandyopadhyay (TS). **Puffed rice-detection of fraudulent use of urea.** *Journal of Food Science and Technology (India)* 28(4): 1991: 239

Alleged injurious use of urea in puffed or expanded rice has been investigated. It has been found in a model preparation that about 70% of 1% urea is retained in 'High temperature short time (HTST)' puffing. An analytical method based on the use of urease has been devised which is sensitive to 0.1% urea. The method is rapid and simple, and can be

adopted to field or Kit tests. A number of commercial samples showed it presence and toxicological significance of urea injestion has been discussed. AS

Ryes

2357

Ask (L), Nair (B) and Asp (N-G). **Effect of scalding procedures on the degradation of starch in rye products.** *Journal of Cereal Science* 13(1): 1991: 15-26

Scalding is an ancient procedure practised in Sweden whereby a certain part of rye flour is mixed with hot water and used in dough making after a holding period. Use of scalding improves the baking quality of the rye flour, the physico-chemical characteristics of the rye dough, the shelf-life of the rye bread and its sensory qualities. Among the Swedish bakeries, the scalding technique varies very much with regard to the proportion of flour to water, temp. of the water, mixing temp. and duration of the holding period. In this investigation the nature and extent of starch degradation in the rye flour during scalding was investigated using gel filtration and high-performance liquid chromatography techniques. The starch was almost completely gelatinized (degree of gelatinization > 98%) in all the scaldings except one. The starch from the meals showed very similar elution patterns while the starch from the scalded flours showed great variation. In both the mild scalding as performed in the lab. and in the scalding produced in the bakery by a continuous process, the starch degradation was very extensive and the maltose content was very high (16 - 24% of the dry matter). AS

Wheat

2358

Pal Singh (R) and Bakshi (AK). **Wheat hardness: Effect of moisture on pearling index and kernel hardness.** *Journal of Food Science and Technology (India)* 28(4): 1991: 246-248

Fourteen bread wheat var. commercially grown in the region were studied for grain hardness using barley pearler and kernel hardness tester in the moisture range of 10 - 14%. The moisture level affected the pearling indices significantly when pearling time of 45 sec was used. However, its effect was non-significant when the pearling time was extended to 60 sec as also on the kernel hardness tester values. The increase in the pearling time had a greater effect on the softer var. than the harder ones. The varietal differences were significant in all the cases. Kernel hardness tester is preferred over the barley pearler as the former is not affected by the factors which affect the latter. AS

2359

Khelifi (D) and Branlard (G). **A new two-step electrophoresis method for analysing gliadin polypeptides and high and low molecular weight subunits of glutenin of wheat.** *Journal of Cereal Science* 13(1): 1991: 41-47

Previously, three separate, one-dimensional electrophoresis separations have been required to determine the gliadin and high and low mol. wt. glutenin subunit comp. of wheat. A method is described here in which only two electrophoresis steps are necessary. After protein extraction with 2-chloroethanol, gliadin comp. was determined first by fractionation using polyacrylamide gel electrophoresis at acid pH (A-PAGE). The unreduced polymeric proteins present in the first few millimeters of the A-PAGE gels below the sample wells were then reduced and separated by SDS-polyacrylamide gel electrophoresis (SDS-PAGE). These proteins yielded polypeptide patterns that were characteristic of the high and low mol. wt. subunits of glutenin. AS

2360

Posner (ES) and Li (YZ). **A technique for separation of wheat germ by impacting and subsequent grinding.** *Journal of Cereal Science* 13(1): 1991: 49-70

A technique was developed for the separation of the embryo and scutellum, which make up the wheat kernel germ, with improved yield and purity. The wheat embryo was separated prior to grinding by using the impact action of a horizontal scourer. Factors influencing embryo separation and the optimum working parameters of equipment for processing four classes of wheats were studied. A wheat moisture content of 13.5% (w/w) and a working vol. of 5.95 p m ^{3}/kg for the impacting scourer were the parameters that gave optimal embryo extraction and minimized kernel breakage. The yield of pure and intact wheat embryo ranged from 0.74 to 1.20% on a wheat wt. basis, which represented 53.6 to 91.6% of wheat embryos present in samples dissected by hand. Subsequently, in the milling process the scutellum was separated by proper sieve selection of the 2 BK and 3 BKf and a grinding gap of 0.279 mm for 3 BKf roll. The scutellum was purified using a gravity table, with a yield ranging from 0.75 to 1.75% on a wheat wt. basis. The embryo and scutellum products had high protein and crude fat contents. Removal of the embryonic axis, scutellum, and some additional

flaked embryo during the process did not affect wheat milling quality. The flour's chem. comp. was also unaffected, but the protein and fat contents of the mill feed were reduced. The germ products resulting from the new technique retain both morphological integrity and chem. comp. AS

Wheat flour

2361

Eliasson (A-C), Silverio (J) and Tjerneld (E). **Surface properties of wheat flour-milling streams and rheological and thermal properties after hydration.** *Journal of Cereal Science* 13(1): 1991: 27-39

Five different flour streams together with the main white flour from a winter -wheat mixture and a spring-wheat mixture, resp., were obtained from a commercial mill. Physical properties of these flour streams were investigated and related to a model of the dough describing it as a foam. Interfacial behaviour of spread material, rheological properties of doughs and gelatinization of starch were investigated. The flours from the reduction system were all very similar in their interfacial behaviour, and decreased the surface tension of water to about the same extent. An early break flour stream was found to be more surface-active, i.e. a smaller amount of flour was required to get the same decrease in surface tension of water. The relaxation modulus (G) was higher for doughs made from reduction flour streams than for doughs made from break flour streams. The gelatinization behaviour could be related to starch damage and protein content of flour. There were also differences in physical properties of flours from the two wheat mixtures. If complete spreading of protein was assumed, the result indicated the formation of thicker protein films in case of the spring wheat. The lower protein winter-wheat doughs were weaker (i.e. lower G values) than the spring-wheat doughs. The gelatinization temp. was higher for the spring-wheat flours. AS

2362

Renard (CMGC), Rouau (X) and Thibault (JF). **Structure and properties of water-soluble pentosans from wheat flour.** *Sciences Des Aliments* 10(2): 1990: 283-292 (Fr)

Pentosans are quantitatively minor components of wheat but they influence technological properties of flour, notably by their rheological behaviour. Water-soluble pentosans have been extracted from flour (wheat Top, grade 55) by cold water (4 C). The pentosans were collected by alcohol precipitation after deproteinisation and removal of residual starch. The yield was 1% of the flour dry wt. The precipitate contained 33% (w/w) xylose, 25% arabinose and 11% galactose. The ferulic acid content was low (0.1%). The precipitate also contained 13% proteins, 5% uronic acids and minor amounts of glucose, mannose, rhamnose and fucose. Analysis of the glycosidic linkages of methylation analysis showed the presence of arabinoxylans and of type II arabinogalactans. Two populations could be separated by gel-filtration on Sepharose CL-6B. Ferulic acid was eluted with the high mol. wt. fraction. The water-soluble pentosans were highly viscous. Treatment with oxidants such as persulphate or chlorite led to an increase in viscosity but without obtention of a gel. AS

Wheat proteins

Gliadins

2363

Bollecker (S), Viroben (G), Popineau (Y) and Gueguen (J). **Acid deamidation and enzymatic modification at pH 10 of wheat gliadins: Influence on their functional properties.** *Sciences Des Aliments* 10(2): 1990: 343-356

A wheat gliadin (gamma 46) was modified by treatments with 0.1N HCl and H_2SO_4 at 70 C during 2 or 4 h. The protein was thus partially deamidated (5 - 25%) but no peptide bond hydrolysis was observed. Besides gliadins and standard proteins (ovalbumin, bovine serum albumin, β-lactoglobulin) were treated at pH 10 by proteases (papain, chymotrypsin, trypsin). Contary to the results of KATO et al. (1987), no deamidation due to the enzymes was measured in those conditions, but alkali treatment, even without enzyme, modified the gliadins. Moreover, all the proteins studied were enzymatically digested, whatever the protease employed. Acid deamidation gliadins were highly soluble at pH 8 and stabilize the emulsions and the foams. The strength of this effect is related to the deamidation rate of the proteins. On the other hand, the gliadins modified by enzymes at pH 10, although very soluble, did not stabilize foams. They had also a low efficiency to slow down flocculation and creaming of emulsions. The results are discussed in relation with physical properties of the modified proteins. AS

Wheat starch

2364

Freeman (TP) and Shelton (DR). **Microstructure of wheat starch: From kernel to bread.** *Food Technology* 45(3): 1991: 162, 164-168

This article deals with a microscopic study of Len, a hard red spring wheat to determine the changes in starch and protein during milling, mixing and baking. Flour and dough mixing (endosperm and flour and dough mixing), dough ultrastructure (optimally mixed dough, the first punch stage, the second punch stage, the pan stage and the baking stage) are described. CSA

MILLETS

Corn

2365

Gonzalez (RJ), Torres (RL), de Greef (DM) and Gordo (NA). **Extrusion-cooking of corn grits: Viscosity model and its application to the flow equations.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 347-355

Viscosity of an amilaceous material -corn flour- was evaluated within an extruder. The experiments were carried out under the following conditions: 10 DN Brabender extruder, 3:1 compression ratio screw, working temp. of 150 C and moisture of the raw material 30%, shear stress and shear rate values were calculated from data of pressure and mass flow obtained for dies with different l/r ratios. Parameters m and n of the power law model $T = m\ g^{.n}$ were determined. This model was used in the flow equations applied to the Brabender extruder and comparison between experimental and predicted mass flow was made. Similar comparison was made for the Newtonian behaviour. Application of the Newtonian model lead to a deviation from experimental values depending on die dimensions, whereas with the non-Newtonian model this dependence practically disappeared the deviation being proportional to the mass flow. AS

Corn proteins

2366

Zayas (JF) and Lin (CS). **Corn germ protein in frankfurters: Textural, colour and sensory characteristics and storage stability.** *Journal of Food Quality* 12(4): 1989: 283-303

Textural properties, water holding capacity, colour, sensory characteristics, and storage stability of frankfurters containing hexane-defatted corn germ protein (CGP) as a meat extender were studied. CGP was incorporated at 2 and 3% levels as a powder or a preswelled slurry. Batter viscosity and shear force values of frankfurters were increased by the preswelled CGP. The redness values of the experimental samples with 2 and 3% CGP added as a powder were less than those of controls. There were no significant effects of CGP incorporation or its preswelling on the initial sensory properties of frankfurters. Meaty flavour and aroma and off-flavour acceptability decreased during 45 days of storage. Off-flavour and off-aroma of frankfurters showed a slight increase with time in storage. Total volatile N and nonammonia amino nitrogen of experimental and control frankfurters were not significantly different. AS

PULSES

2367

Gujska (E) and Khan K. **High temperature extrusion effects on protein solubility and distribution in navy and pinto beans.** *Journal of Food Science* 56(4): 1991: 1013-1016

Osborne protein solubility fractionation and polyacrylamide gel electrophoresis (PAGE) showed changes in protein distribution during high temp. extrusion of pinto and navy bean high starch fraction (HSF). A high degree of protein insolubility was found after extrusion, which resulted in a decrease in solubility of albumin and globulin fractions and an increase in the residue. An extrusion temp. of 110 C had a greater effect on solubility of albumin and globulin fractions of pinto than navy bean. Sodium dodecyl sulphate (SDS)-PAGE showed more changes in subunit patterns of albumin and globulin for pinto than for navy beans at 110 C. Higher temp. of 135 and 150 C caused greater changes in gel electrophoretic patterns of albumin and globulin fractions of navy beans. AS

2368

Gernat (C), Radosta (S), Damaschun (G) and Schierbaum (F). **Supramolecular structure of legume starches revealed by X-ray scattering.** *Starch/Starke* 42(5): 1990: 175-178

The X-ray wide-angle scattering patterns of legume starches are attributed to the C-type in contrast to the A- and B-type of cereal and root starches. Starting from the question if this C-pattern is to be considered as a mixed A- and B-type or as an independent X-ray wide-angle diffractogram, examinations have been performed with starches from *Vicia faba* and *Pisum sativum* in comparison with pure A- and B-type starches from maize and potato. The phase proportions in the crystalline parts of the C-starches were calculated by means of a linear regression method. The pea starch is composed of 38.6% type B and 61.4% type A, and for the starch of bean it was calculated as 17.0% type B and 83.0% type A. By these results as well

as by the high values for the correlation coeff. it is proved that the starch C-polymorph is a mixture of A- and B-unit cells. The legume starches consist of starch granules of pure A-type as well as of pure B-type in varying relations. AS

Chickpeas

2369
Paredes-Lopez (O), Gonzalez-Castaneda (J) and Carabez-Trejo (A). **Influence of solid substrate fermentation on the chemical composition of chickpea.** *Journal of Fermentation and Bioengineering* 71(1): 1991: 58-62

A basic procedure was developed to produce a fermented product by solid substrate fermentation using *Rhyzopus oligosporus* and chickpea as substrate. Water activity was kept at 0.92 throughout the process. Fermentation increased total, 'true' and soluble proteins, soluble solids and soluble carbohydrates, and decreased fiber content and pH. About 12% of solids were lost during 72 h of fermentation. The content of most fatty acids was enhanced by fermentation, whereas peroxide value and tannins declined. The colour of the fermented product was not deteriorated after 72 h of fermentation. Scanning electron microscopy studies of microbial growth on the substrate showed penetration of fungus hypae and degradation effects on the chickpea cotyledon cells. AS

Cowpeas

2370
Akinlosotu (A) and Akinyele (IO). **The effect of germination on the oligosaccharide and nutrient content of cowpeas (*Vigna unguiculata*).** *Food Chemistry* 39(2): 1991: 157-165

Cowpea seeds (cvs local white and local brown) of Nigeria were germinated for 96 h and sampled at 24, 48, 72 and 96 h and determined for changes in oligosaccharides, energy, protein, ascorbic acid, niacin, thiamin, Ca, Mg, Fe, K and P. A gradual decrease in oligosaccharide content with germination while the level of monosaccharide increased. Protein and energy content increased slightly while Ca and Fe decreased with germination. Both ascorbic acid and niacin increased significantly while thiamine decreased significantly. The above findings indicate germination may be a useful process for improving the nutritive value of cowpeas and to reduce the flatuence properties by increaing the level of some nutrients. BV

Entada scandens

2371
Janardhanan (K) and Nalini (K). **Studies on the tribal pulse, *Entada scandens* Benth.: Chemical composition and antinutritional factors.** *Journal of Food Science and Technology (India)* 28(4): 1991: 249-251

The seeds of *Entada scandens* Benth. are known to be consumed as a pulse by the Indian tribal sects, the Great Andamanese and Onges. The seeds contain fairly high amounts of crude protein, crude fibre and ash and minerals, like K, P, Mg, Fe, Zn, Pb and Mn when compared to common pulses of India and NRC/NAS recommended dietary allowance values. The seed protein fractions, albumins, globulins, prolamins and glutelins, occur in the ratio of 27:49:6:18, resp. Both albumins and globulins form the major bulk of seed proteins, constituting 76% of the total seed proteins. The antinutritional factors, total phenols, tannins, trypsin inhibitor activity, haemaggiutinating activity and L-DOPA (3,4-dihydroxyphenylalanine) have also been detected. AS

Fababeans

2372
Hussein (L), Ghanem (K), Khalil (S), Nassib (A) and Ezilarab (A). **The effect of phytate and fiber content on cooking quality in faba beans.** *Journal of Food Quality* 12(4): 1989: 331-340

Seventy-six faba bean lines were analyzed for their phytic acid content in the whole seeds and in the cotyledons. The fiber content was also determined in 17 faba bean lines. The seed wt.; % testa wt. of the seeds; and % moisture uptake (water imbibition) after overnight soaking in distilled water or increasing concn. of EDTA solutions were measured and recorded. The relation between the above mentioned dependent variables and the cooking time for seed softening (min.) in 76 faba bean lines was studied and simple and multiple correlation coeff. were computed with a total of 70 operations. Significant correlation coeff. were found between phytic acid content in the cotyledons, % testae wt. of the seeds; moisture uptake after soaking the seeds in distilled water overnight and cooking time for 50% softening (min). The faba bean lines 606 / 303; 606 / 308; 608/ 334; 609/ 350, proved to be of excellent cooking quality, since their cooking time for 50% seed softening did not exceed 10 min. AS

2373

Biswal (RN), Bozorgmehr (K), Tompkins (FD) and Liu (X). **Osmotic concentration of green beans prior to freezing.** *Journal of Food Science* 56(4): 1991: 1008-1012

Osmatic dehydration as an intermediate step in freezing vegetable tissue, with green beans (C. V. Bush Blue Lake-47) and aqueous sol. of NaCl as the osmotic media was studied. The kinetics of osmotic concn. of green beans in aqueous sol. of NaCl was modeled and the acceptability of osmotically concentrated frozen green beans was evaluated. Green beans were osmotically concentrated in NaCl-water sol. at three concn. (5, 10 and 17% NaCl by wt.) and three temp. (8, 20 and 40 C). Green beans contacted with 17% NaCl-water at room temp. for 1 h lost 22% of original moisture, whereas beans contacted with 10% NaCl-water solution at 20 C for 30 min, frozen in an air blast freezer was found organoleptically acceptable. SRA

Lentils

2374

Tang (J), Sokhansanj (S), Slinkard (AE) and Sosulski (F). **Quality of artificially dried lentil.** *Journal of Food Process Engineering* 13(3): 1990: 229-238

The effects of artificial drying on Laird lentil qualities such as breakage susceptibility, cooking quality, and seed germination were determined at 3 initial moisture levels, 16, 18, 20% wet basis and 7 levels of drying temp. varying from 40 to 80 C. Cooking quality was not affected by drying in the range of treatments used in this study. High initial moisture content and lengthy drying periods at temp. above 40 C were associated with increased seed breakage. Seed germination was particularly sensitive to heat treatment at 80 C and extended drying time for high moisture samples. AS

Lupins

2375

Champ (M), Barry (JL), Bonnet (C), Berot (S) and Delort-Laval (J). **The role of cell wall polysaccharides and** α-galactosides in the flatus induced by the consumption of a legume seed (lupin) in the rat. *Sciences Des Aliments* 10(2): 1990: 317-323

Most of the legume seeds induce flatus which is usually attributed to the presence of α-galactosides. However these legumes contain high levels of fibres which can also be the substrates of caeco-colic fermentations. In order to dissociate the fermentations due to the α-galactosides from those due to the fibres, a purified fibre fraction of a lupin oil meal was prepared. This fibre fraction was completely free of α-galactosides. Three semi-synthetic diets containing the lupin meal (with most of the α-galacosides of the seed), the fibres isolated from the meal or a mixture of both, were compared to a diet with no lupin fibre during an experiment with rats adapted to the experimental diets. The excretion of gases by the rats was determined using a respiration chamber. Hydrogen excretion by the rats was much larger with diets containing meal or lupin fibres than with the one which contained only pure celluiose as a fibre source. None of these diets induced a large excretion of methane. There were no statistical differences in amounts of hydrogen excretion by the rats fed diets containing lupin meal, lupin fibres or a mixture of both ingredients. AS

Peas

2376

Abdel-Kader (ZM). **A study of the apparent diffusion coefficients for ascorbic acid losses from peas during blanching in water.** *Die Nahrung* 34(9): 1990: 811-817

This study is concerned with the loss of ascorbic acid from peas during water blanching at 50, 60, 70, 80 and 90 C for 0, 2, 4, 6, 8 and 10 min, in an attempt to elucidate the mechanisms involved in such losses. When the agitation of the blanch water is sufficient, the surface is made negligibly small, and the total resistance to the loss of ascorbic acid from peas to the blanch water is controlled by diffusion mechanism only. So the apparent diffusion coeff. (D) for ascorbic acid loss from peas were calculated after blanching under various conditions. When the temp. ranged from 50 to 90 C, values of D were found to be in the range of 0.94×10^{-8} to 1.94×10^{-8} $m^2 s^{-1}$, having an activation energy of 18.71 kJ/mol. The results indicate that, if there was a sufficient agitation, the leaching of ascorbic acid from peas during blanching in water was controlled by "diffusion". BV

2377

Stute (R). **Properties and applications of pea starches. Part I. Properties.** *Starch/Starke* 42(5): 1990: 178-184 (De)

2378

Stute (R). **Properties and applications of pea starches. Part II: Applications.** *Starch/Starke* 42(6): 1990: 207-212 (De)

The following applications of pea starch are proposed on the basis of its properties: (1) the preparation of gels (e.g. puddings) which can be prepared with about 50% less starch in comparison to corn starch; (2) the production of extruded products and instant starches which can be produced without the significant loss in viscosity which occurs with other starches; (3) the production of roll-dried starches, fruit and vegetable flakes having a pulpy texture after rehydration, and which have a considerable stability at cooking temperatures; (4) for the production of pulpy products via the freeze-thaw (sponge) technology, which keep the pulpy texture even after prolonged cooking; and (5) for the production of roll-dried instant starches with cold swelling/gelling properties, which can be used as such or for the formulation of various instant desserts with a flan-like texture. BV

2379

Krempf (M) and Tome (D). **Reductive alkylation of amino groups in pea (*Pisum sativum* L.) seed lectins: Chemical and biological evaluation.** *Sciences Des Aliments* 10(3): 1990: 671-678

Reductive alkylation of amino groups allowed the introduction of labelled methyl groups into pea seed lectins without significant alteration of their properties including SDS-PAGE migration, blood plasma glycoprotein precipitation and antilectins serum reactivity, and only a reduction of hemagglutinating activity for high level of methylation. Lysine appeared as the major site of fixation of the labelled methyl groups and was primarily transformed into dimethyllysine. Nearly 90% of the lysine was dimethylated whereas 10% of the lysine remained unaffected. This technique could be useful for the analysis of the digestive and metabolic fate of ingested lectins. AS

Yam beans

2380

Enwere (NJ), Hung (Y-C) and Ngoddy (PO). **Texture and microstructure of African yam bean (*Sphenostylis sternocarpa*) products.** *Journal of Texture Studies* 21(4): 1990: 377-394

The microstructure of African yam bean (*Sphenostylis sternocarpa*) cotyledons, flour, starch and gel prepared from flour were examined using scanning electron microscopy. Smooth starch granules varying in size and shape were embedded in the protein matrix. The starch granules maintained their integrity in the flour after milling. The texture profile parameters of starch and flour gels were studied at both 50 and 75% double compression and relaxation levels using the Instron Universal Tester. Significant variations were observed in the texture of the top and bottom portions of the gel. Increased solid content from 10.00 to 25.04% significantly increased the hardness of yam bean gel; however, further increase of solid content to 30.80% had only limited effect. Addition of oil decreased hardness of plain gel which may be due to the shortening and softening effects. AS

2381

Ofuya (CO), Njoku (HO) and Eli (I). **Development of a cheese-like product from the African yam bean (*Sphenostylis sternocarpa*).** *Food Chemistry* 39(2): 1991: 197-204

A vegetable cheese-like product (Akede cheese) was developed in this study from the African yam bean (*Sphenostylis sternocarpa*) by curdling of a filtered slurry of dehulled beans soaked in 4% NaCl. The coagulants were hydrated calcium sulphate (4×10^{-2}M) or 5% mixed cultures of lactic acid bacteria. The most acceptable products as regards flavour and texture were produced in a 1:4, bean to water ratio, and a short homogenisation time. The crude protein content of the product was 48.1%. Moisture content was 51.9%, and it has 35×10^{-6} meq/g total titratable acidity. The shelf-life of the product was 48 h under refrigerated storage. The results could be important in providing an alternative method for utilizing the bean seed. AS

2382

Onyeike (EN), Abbey (BW) and Anosike (EO). **Kinetics of heat-inactivation of trypsin inhibitors from the African yam bean (*Sphenostylis stenocarpa*).** *Food Chemistry* 40(1): 1991: 9-23

Six different solvents were investigated for their efficiency in the extraction of trypsin inhibitors from the African yam bean. Of these, sodium hydroxide extract gave a marginally higher specific trypsin inhibitory activity (4.32×10^{-2}) than those of sodium chloride (4.10×10^{-2}) and distilled water (3.93×10^{-2}). The K_m and V_{max} for trypsin in the presence of a certain amount of trypsin inhibitor activity decreased as process temp. increased. At a fixed trypsin concn. of 100 µg ml^{-1}, the rate of inactivation of trypsin inhibitor activity increased as substrate concn. increased from 0.230 mM to 0.575 mM. The rate, however, decreased as substrate concn. was further increased from 0.690 mM to 1.150 mM due to substrate inhibition. At a constant period of heating (30 min), trypsin inhibitor activity (TIA) decreased from 2.21 to 0.332 mg pure trypsin inhibited per gram of sample as temp. of heat treatment increased from 80 - 180 C, and the determined values of the first order inactivation rate

constants increased. As the assay pH decreased from 10.5 to 5.50, the inactivation energy decreased from 21,155 - 10, 496 Jmol $^{-1}$. At a constant temp. of heat treatment, trypsin inhibitor activity decreased over time. AS

OILSEEDS AND NUTS

Almonds

2383

Cunningham (S). **The effect of roasting and other processes on almond quality.** *Manufacturing Confectioner* 69(11): 1989: 67-70

This paper discusses the preparation of almonds for their role in confectinery products. Oil roasting and dry roasting produce same basic flavour in roasted nut except for slight difference in texture and mouth feel. Almonds which are dry roasted are more crisp and shelf-life is equal or greater than oil roasted. Almonds constitute nutrition to confections. SRA

Coconuts

Coconut milk

2384

Agrawal (KK), Choudhary (PL) and Sharma (VS). **Preparation of coconut milk.** *Journal of Food Science and Technology (India)* 28(4): 1991: 255-256

Coconut milk is the product which is prepared by blending skim milk powder with coconut milk of freshly grated coconut and pasteurized at 70 - 72 C for 10 min. It contains 6% skim milk powder (SMP) and 9.65% total solids on sterilization and it can be utilized as coconut flavoured milk in food industry. AS

Groundnuts

2385

Devdhara (VD), Veeranjaneyulu (B), Murthi (TN), Punjrath (JS) and Aneja (RP). **Production of partially defatted groundnuts using an inclined hydraulic cage press.** *Journal of Food Science and Technology (India)* 28(4): 1991: 200-203

A process for manufacture of partially defatted groundnuts using an inclined hydraulic cage press specially designed and fabricated indigenously with cage capacity of 100 kg/batch is described. Among different processing conditions studied, predrying of the kernels to 3.5 - 6.0% moisture from an initial moisture of 5.8 - 8.0%, rate of application of pressure, use of partition plates for obtaining an optimum oil recovery (52.0%) are described. The pressed nuts were hydrated to an optimum moisture content of 13%, and dried at 110 C for 30 min to regain the original shape of the nuts easily. These nuts were further roasted at 120 C for 1 h to have acceptable crispness and flavour. The oil obtained during pressing the nuts at ambient temp. (30 C) is of superior quality due to its low free fatty acid (FFA) (0.08%) and light in colour (5 units, Y + 5R), while pressing the nuts at 70 C resulted an oil having 0.5% FFA and 8 units colour. AS

Groundnut proteins

2386

Basha (SM). **Deposition pattern of methionine-rich protein in peanuts.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 88-91

The methionine-rich protein (MRP) accumulation pattern in peanut (*Arachis hypogaea* L. cv. Florunner) seed was studied by using seeds of different maturities from plants harvested at weekly intervals for 9 wks 95 days after planting. Immature seed contained less MRP than the mature seed. Max. MRP accumulation occurred between the first and third maturity stages, and accumulation from the third to sixth maturity stage was minimal. In general, seeds from later diggings contained higher amounts of MRP than the seeds from early diggings. Examination of MRP polypeptide maps from maturing seeds showed that these polypeptides accumulated in varying amounts during maturation. AS

Rapeseeds

Rapeseed meals

2387

Gattinger (LD), Duvnjak (Z) and Khan (VA). **Enzymatic saccharification of canola meal.** *Journal of Chemical Technology and Biotechnology* 49(2): 1990: 155-164

For the enzymatic saccharification of canola meal by enzymic preparations from *Trichoderma reesei* as well as by commercially available hemicellulase and multienzyme preparations, a pretreatment consisting of autoclaving is necessary. These enzyme preparations hydrolysed over 20% (w/w) of pretreated canola meal, which constitutes over 70% saccharification of the total polysaccharides present in canola meal. The results show that saccharification of canola meal is mainly brought about by hemicellulases capable of degrading arabinogalactan, arbinoglucan, galactan and

galactomannan, while cellulases and xylanses play a minor role. These hemicellulases were found to be more stable at 50 C than cellulases or xylanases. This pretreatment also released water-soluble polysaccharides consisting mainly of arabinose and glucose. *Trichoderma reesei* was unable to produce enzymes capable of hydrolysing this polysaccharide when cultivated on canola meal as substrate. AS

Soybeans

2388

Patil (RT), Jaswant Singh and Bargale (PC). **Development of wet dehuller for blanched soybean.** *Journal of Food Science and Technology (India)* 28(4); 1991: 234-236

To remove hulls from blanched whole soybean, an unit based on the principle of rubbing and floatation was designed and fabricated. It is a batch type unit where hulls are removed from cotyledons by friction between two surfaces of wiremesh in the presence of water. The hull separation is achieved by difference in wt. of hulls and cotyledons. The dehuller was tested by dehulling blanched soybean in the batch capacities of 1, 2, 4, 5 and 8 kg. The rotor speed was between 72 and 96 r.p.m. It was found that hull separation efficiency increased with increase in capacity upto 4 kg/batch and thereafter it showed decreasing trend. Dehulling was found almost complete with about 50% separation efficiency. AS

2389

George (AA) and de Lumen (BO). **A novel methionine-rich protein in soybean seed: Identification, amino acid composition, and N-terminal sequence.** *Journal of Agricultural and Food Chemistry* 39(1); 1991: 224-227

Using the powerful resolution obtainable with two-dimensional gel electrophoresis and an *in vitro* labeling method was developed for detecting methionine-containing proteins, a new methionine-rich protein (MRP) in soybean seed was identified, confirmed its methionine content by amino acid microanalysis, and sequenced its N terminus without using the usual protein purification procedures. The complete amino acid comp. and N-terminal sequence of the first 20 amino acids are presented. The MRP has a methionine content of 12.1%, constitutes 0.6% of the total protein, and has a mol. wt. of 18,800. This value is exceptionally high considering that the av. overall methionine content of soybean seed protein is 1.4%. This is the first report of an exceptionally methionine-rich protein in soybean seed that is distinct from the methionine cysteine protein reported earlier and from the cysteine-rich proteins reported previously by other workers. The MRP presents a genetic engineering strategy to improve the nutritional quality of soybean protein and raises the question of its possible biological role in the seed. AS

2390

Muzilla (M), Unklesbay (N), Helsel (Z), Unklesbay (K) and Ellersieck (M). **Effect of particle size and heat on absorptive properties of soy hulls.** *Journal of Food Quality* 12(4); 1989: 305-318

Given the potential contribution of soy hulls to the human diet, a methodology was developed to determine their moisture and lipid absorptive properties under conditions simulating those within a restructured pork product during thermal processing. Lab. procedures were developed to determine the interactive effects of particle size, heat (25, 50, 75 and 95 C), varying levels of available water, pork lipids, and water/pork lipids emulsions upon absorption abilities. Absorption of all media was influenced by particle size; as particle size increased, media absorption generally increased. Higher temp. tended to increase water and water/pork lipid emulsion absorption, but had no effect on pork lipid absorption. Water was found to be preferentially absorbed over lipids. These results can be used by food processors in developing a restructured pork/soy hull products for human consumption. AS

2391

Muzilla (M), Unklesbay (N), Helsel (Z), Unklesbay (K) and Ellersieck (M). **Water and lipid absorption properties of lignin-reduced soy hulls.** *Journal of Food Quality* 12(4); 1989: 319-329

Given the nutritional benefits of incorporating lignin-reduced soy hulls into human foods such as restructured pork products, their moisture and lipid absorptive properties were investigated. The effects of 3 particle sizes, heat and level of media (water, pork lipid and water/pork lipid emulsion) were investigated. As particle size increased, water and emulsion absorption generally increased. The fine particle size absorbed less lipids than either of the two larger sizes. An increase in temp. generally increased water absorption, had little effect on emulsion absorption, and no effect on lipid absorption. Water was preferentially absorbed over lipids. Differences in composition enabled lignin-reduced soy hulls to absorb up to 53% more water than unprocessed soy hulls. These results can be used to predict the functional properties of soy hulls when exposed to different media during product formulation. AS

Soy products

Soymilk

2392

Chandrasiri (V), Geurmani (L), Bau (HM), Villaume (C), Mejean (L), Nicolas (JP). **Yield and physicochemical characteristics of soy milk-protein curds obtained by physicochemical and enzymatic coagulations.** *Sciences Des Aliments* 10(2): 1990: 333-342

Four soy milk protein preparations were compared: curd clotted with $CaSO_4$(CaC), curd clotted with glucono-delta-lactone (GDLC), curd clotted with bromelain (BC) and curd clotted with papain (PC). Two other protein fractions prepared by clotting soy bean milk obtained from 1-day germinated soybean with $CaSO_4$ and GDL, were also studied. The conditions of preparation and properties are discussed in detail. The curds had a high protein and lipid content. The lipid extraction yield was high (> 47%) and the protein yield was greater than 43% for CaC and GDLC and only 28% for BC and PC. $CaSO_4$-clotted curds had a high ash and phytic acid content. They were particially free of ethanol-soluble sugar and had a firm texture. Enzymatically clotted curds contained the most lipid (> 35%) and high levels of ethanol soluble sugars (greater than or equal to 6.5%). PC contains the higest level of available lysine among the studied samples. They had an unctuous and creamy texture. Because of this diversity in comp. and texture, these curds should have a wide range of uses in the food industry. AS

Soy proteins

2393

Dahl (SR) and Villota (R). **Twin-screw extrusion texturization of acid and alkali denatured soy proteins.** *Journal of Food Science* 56(4): 1991: 1002-1007

The effects of pH on protein texturization has been investigated, product characteristics (texture and microstructure) were correlated with specific feed functional properties and the results were discussed in terms of possible mechanisms of texturization. The results showed that the use of acid in modifying soy proteins tended to decrease expansion and increase rheological properties of extrudates. The fibrils observed in SEM indicated protein orientation disorder. Slightly alkaline extrudates had increased expansion but less texture development. The physicochemical state of soy protein, particularly conformation and protein-water interactions as affected by pH, may influence expansion of textured products and development of plexilamellar structure. SRA

2394

Oates (CG) and Ledward (DA). **Thermal behaviour of soya 7S globulin: Effect of moisture content and added hydrocolloid on the denaturational change in heat capacity.** *Food Chemistry* 40(1): 1991: 101-107

This paper describes an unusual and previously unreported phenomenon relating to the change in specific heat function of soya 7S globulin on denaturation in the presence of alginate, rich in mannuronic acid. Measurements of the relative change in the specific heat of soya 7S globulin on denaturation were determined at a range of moisture contents (5 to 50%) by differential scanning calorimetry. The specific heat function associated with denaturation of the 7S globulin was found to increase in most of the soya and soya + hydrocolloid systems examined, the magnitude of the increase was dependent on initial moisture content. In the presence of 2% of a mannuronic acid-rich alginate, soya 7S globulin unusually displayed a lower specific heat function following denaturation. AS

Sunflowers

2395

Shamanthaka Sastry (MC) and Narasinga Rao (MS). **Effect of chemical modification of sunflower 11S protein on the binding of chlorogenic acid.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 63-66

The binding of chlorogenic acid by sunflower 11S protein and succinylated and N-ethylmaleimide-treated protein was measured at pH 4.0 in 0.1 M acetate buffer. Succinylation reduced binding, whereas N-ethylmaleimide treatment did not. Analysis of the binding data showed that succinylation reduced the number of binding sites without affecting the binding affinity. N-ethylmaleimide treatment reduced neither the number of binding sites nor the binding affinity. Succinylation dissociated the 11S protein, whereas N-ethylmaleimide treatment did not. The secondary structure of N-ethylmaleimide-treated protein was different from that of the unmodified protein. AS

TUBERS AND VEGETABLES

Root vegetables

Beet

2396

Leclere (C), Cherbut (C), Guillon (F) and Champ (M). **The effect of soluble fibre content of beet pulp on the *in vitro* alpha-amylolysis of a semi-synthetic meal.** *Sciences Des Aliments* 10(2): 1990: 309-315

Sugar-beet pulps were treated by autoclaving and/or freeze-drying. Autoclaving increased the soluble/insoluble fibre ratio but freeze-drying had no effect. Sugar-beet pulps were mixed with a semi-synthetic diet simulating a human meal in order to introduce 6% total fibre content. The diets were incubated with a porcine pancreatic α-amylase for 2 h. The initial *in vitro* hydrolysis pattern of the meal starch was changed by beet fibres. Increase in soluble fibre concn. by autoclaving did not reinforce this effect. AS

Cassava

2397

Raja (KCM), Sreedharan (VP), Prema (P) and Ramakrishna (SV). **Cyclodextrin form cassava (*Manihot esculenta* Crantz) starch. Isolation and characterization as bromobenzene and chloroform chlathrates.** *Starch/Starke* 42(5): 1990: 196-198

An attempt has been made to prepare β-cyclodextrin (CD) from cassava starch. Freshly prepared samples of cassava starch from M-4 var. was treated with Standard cyclodextrin glycosyltransferase and the product obtained was converted to bromobenzene and chloroform chlathrates. The product was identified by non-chromatographic spectrophotometric assay and by thermal decomposition behaviour. The bromobenzene β-CD chlathrate showed a distinct pattern of thermal degradation compared to that of both pure β-CD as well as β-CD chloroform chlatrates. The yield of the product isolated is approx. 10% (w/w) based on starch. AS

2398

Monroy-Rivera (JA), Lebert (A), Marty (C), Muchnik (J) and Bimbenet (JJ). **Determination of cyanogenic compounds in cassava during heated air drying.** *Sciences Des Aliments* 10(3): 1990: 647-658

This article describes the analysis and detoxification of different cyanogenic compounds in cassava and the effect of drying at 60 C on cassava chips. A spectrophotometric method has been developed to measure the kinetics of elimination of these cyanogenic compounds. More than 70% of total and bound cyanide was eliminated using a drying temp. of 60 C, an air speed of 1.5 m/s and 25% rh. BV

2399

Barrios-Gonzalez (J), Rodriguez (GM) and Tomasini (A). **Environmental and nutritional factors controlling aflatoxin production in cassava solid state fermentation.** *Journal of Fermentation and Bioengineering* 70(5): 1990: 329-333

A physiological study of *Aspergillus parasiticus* on cassava solid state fermentation was performed to evaluate the risks of aflatoxin (AT) contamination of the cassava protein enrichment process with *Aspergillus niger*. The effects of key enviromental (temp., initial moisture content, aeration rate), nutritional (N and P source concn.) and ecological (mixed cultures using *A. niger* and different amounts of *A. parasiticus*) factors on aflatoxin production by *A. parasiticus* in this culture system were evaluated. It was found that *A. parasiticus* can grow and produce aflatoxins in this system. However, the operation temp. of the protein enrichment process (35 C) drastically reduces potential toxin production. Although N and P concn. in the medium are partially inhibitory for AT biosynthesis, very high production can be attained anyway. The best toxicological protection was the strain itself (*A. niger* no. 10). When these two species grew together in solid state fermentation, aflatoxin production was completely inhibited. AS

Potatoes

2400

Wills (RBH) and Suthilucksanavanish (K). **Seasonal variation in vitamin C and nutrient composition of processed potato products.** *Food Australia* 43(1): 1991: 19-24, 29

This paper reports on the effect of processing on potato comp. and on changes in comp. of products purchased at different times of the year. The vitamin C contents of 'home cooked' fresh potatoes and range of commercially processed potato products were determined at three-month intervals and a range of other nutrients at six-month intervals over a 12-month period. Vitamin C content varied over the purchase period. Both samples of product prepared from fresh potatoes in the lab. and retail outlets tended to have max. vitamin C in spring-summer, and commercially processed products in autumn-winter. Except for products with added vitamin C, those prepared in the lab. had a higher vitamin C content than commercial/outlet prepared products. The analysis showed other compounds like water, protein, fat, cholesterol, sugar, starch, ash, energy content, thiamin, riboflavin, niacin, carotenes, K, Na, Ca, Mg, Fe and Zn. SRA

Potato starch

2401

Yamada (T), Suzuki (K), Katuzaki (H), Hisamatsu (M) and Komiya (T). **GPC profile change of potato starch with extrusion processing.** *Starch/Starke* 42(6): 1990: 217-223

Native potato starch (moisture content 15%) was treated by twin screw extruder under four operating conditions with varying barrel temp. (110 - 230 C). These modified starch samples were compared to native and drum-dried starch. Starch sample sol. for gel chromatography was prepared by the three methods (acidic, alkaline and neutral methods). They were subjected to gel chromatography on Toyopearl HW-75, and some difference was found among the 3 gel chromatographic patterns obtained from the same starch solution. This discrepancy among GPC patterns suggests formation of some types of anhydro-bonds between chains of amylopectin and or amylose in the extrusion process. Elevating barrel temp. increased degree of depolymerization. The size of fragments formed with the treatment is bigger than that of oligosaccharides but smaller than that of amylose. AS

Sweet potatoes

2402

Lu (JY), Miller (P) and Loretan (PA). **Gamma-radiation dose rate and sweet potato quality.** *Journal of Food Quality* 12(5): 1989: 369-376

"Jewel" sweet potatoes were irradiated with gamma-radiation and a dose-rate relationship on nutrients was investigated. The total dose was 1 kGy/h. The results indicated that generally moisture, ascorbic acid and carotenoids level were higher at high dose rates than at low dose rates. Starch and texture tended to decrease with increase in dose rate. Thiamin and riboflavin were not affected by dose rate. The effect on sugars was not clear. The levels of sugar constituents for roots irradiated at 10.40 kGy/h tended to be higher than other dose rates. Some differences were significant. AS

Vegetables

2403

Leclerc (J), Reuille (M-J), Miller (M-L), Lefebvre (J-M), Joliet (E), Autissier (N), Martinez (Y), Perret (A). **Effect of climatic conditions and soil fertilisation on nutrient composition of salad vegetables in Burgundy.** *Sciences Des Aliments* 10(3): 1990: 633-646

Honeydew melons

2404

Dull (GG), Birth (GS) and Leffler (RG). **Existing energy distribution in honeydew melon irradiated with a near infrared beam.** *Journal of Food Quality* 12(5): 1989: 377-381

Emitted intensity was measured at 15 degree increments from the incident beam and around the equator of a honeydew melon which was irradiated with a near infrared beam. Signal strength was adequate up to 75 degree to provide a usable spectrum for NIR analysis of internal tissue. A noisy but recognizable spectrum was obtained at 180 degree. AS

Leafy vegetables

Amaranthus paniculatus

2405

Singhal (RS) and Kulkarni (PR). **Puffing effects on functional properties of *Amaranthus paniculatus* (Rajgeera) seed flour.** *Journal of Food Science* 56(4): 1991: 1121-1122

Among functional properties studied, water- and fat-holding capacities were higher for puffed grain flour. Gelation was not affected, while foaming was adversely affected by puffing. A decrease in viscosity of flour pastes also resulted due to puffing. AS

Spinach

2406

Schwartz (SJ) and Lorenzo (TV). **Chlorophyll stability during continuous aseptic processing and storage.** *Journal of Food Science* 56(4): 1991: 1059-1062

Spinach puree was aseptically processed and packaged at 4 time-temp. treatments (19.2 and 5.3 sec at 142 C; 19.2 and 12.2 sec at 137 C). Samples processed at 142 C for 5.3 sec retained 68% of total chlorophyll compared to blanched samples while all chlorophylls were degraded in retorted product. The rate of chlorophyll b degradation and pheophytin b formation during storage in flexible containers at 4, 25 and 40 C fit a first order kinetic model. Apparent activation energies during storage for each time-temp. treatment ranged between 11.1 and 14.3

kcal/mol. Analyses of degradation products indicated oxidation during storage was not a dominant factor in chlorophyll conversion and colour loss. AS

Muskmelon

2407

Forbus (WRJr), Dull (GG) and Smittle (D). **Measuring netted muskmelon maturity by delayed light emission.** *Journal of Food Science* 56(4): 1991: 981-984

The relationship between delayed light emission (DLE) and physical and chem. properties related to 6 dufferent maturity classes of three netted muskmelon fruit cvs Hale's Best Magnum 45 and Saticoy has been studied. Study indicated that DLE, firmness and chlorophyll decreased with increasing maturity, where as Hunter a and soluble solids increased. DLE correlated highly (r = -0.94) with a calculated maturity index, indicating that DLE could be used as a nondestructive technique for measuring the maturity of netted muskmelon. SRA

Tomatoes

2408

Arnao (MB), Casas (JL), del Rio (JA), Canovas (FG), Acosta (M), Sabater (F). **Use of 2,2'-azino-bis(3-ethylbenzthiazol-6-sulphonic acid) (ABTS) for the measurement of peroxidase activity in tomato fruit extracts.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 333-340 (Es)

The compound 2,2'-azino-bis[3-ethylbenzthiazol-6-sulphonic acid] (ABTS) was used to estimate the peroxidase activity of tomato extract and compared with guaiacol, the traditionally used substrate. The oxidation of ABTS both by tomato extract and by horseradish peroxidase (HRP) gave only one oxidation product with an absorption molar coeff. of 31.100 plus or minus 200 M^{-1} cm^{-1}, six times higher than that of tetraguaiacol. Peroxidase activity measured with ABTS had an optimum pH of 3.3 in tomato extract, and of 4.3 with HRP, and its measurement could be carried out in a considerably shorter time (30 s with ABTS and 3 min with guaiacol). Results obtained showed that ABTS is a much better substrate than guaiacol for measurement of peroxidase activity, both in commercial peroxidases and in enzymatic extracts of tomato fruits. In addition, ABTS is a non-toxic compound, highly soluble in water and very stable in solution. AS

2409

Cho (SI), Bellon (V), Eads (TM), Stroshine (RL) and Krutz (GW). **Sugar content measurement in fruit tissue using water peak suppression in high resolution ^{1}H magnetic resonance.** *Journal of Food Science* 56(4): 1991: 1091-1094

2410

Sian (NK) and Ishak (S). **Carotenoid and anthocyanin contents of papaya and pineapple: Influence of blanching and predrying treatments.** *Food Chemistry* 39(2): 1991: 175-185

Carotenoids of papaya (*Carica papaya* var Subang) and pineapple (*Ananas comosus* var Mauritius) showed higher retention than anthocyanins after blanching and drying. Carotenoids and anthocyanins decreased progressively in pineapple and papaya as the blanching temp. (100 C) and time (1 min for pineapple and 4 min for papaya) increased. Pretreatment with sodium metabisulphite prevented carotenoids from oxidation, but resulted in rapid bleaching of anthocyanins. Orthophosphoric acid, which changed the colour intensity of anthocyanins showed no effect on carotenoids. Carotenoids were more protected in system with higher moisture retained by glycerol and sugar. Anthocyanins, however, were stable only within a certain range of moisture content. BV

Apples

2411

Barwal (VS). **Low-alcoholic beverages from culled apples.** *Journal of Food Science and Technology (India)* 28(4): 1991: 257-258

To utilize culled apple produced from different cvs in Himachal Pradesh in large amounts, an attempt was made to prepare apple cider and wine by fermentation of apple juice and pomace. Physico-chemical and sensory evaluations indicated that cider and wine prepared from apple (*Malus domestica* Borkh.) cvs 'Golden Delicious' and 'Rus Pippin' were preferred most and were at par with 'Royal Delicious' (except wine) in all the attributes. Other cvs differed significantly. AS

2412

Missaire (F), Qiu (C-G) and Rao (MA). **Yield stress of structured and unstructured food suspensions.** *Journal of Texture Studies* 21(4): 1990: 479-490

Yield stresses of 40 model suspensions of apple pulp particles with unimodal and bimodal particle size distribution in water, of 13 commercial food suspensions, and of 11 prepared apple sauce samples were determined by the Vane method (sigma $_{ov}$), and by application of the Casson (sigma $_{oc}$) model. For the unstructured (US) apple pulp suspensions magnitudes of sigma $_{ov}$ and sigma $_{oc}$ were nearly equal, but for the structured commercial and prepared apple sauce samples, magnitudes of sigma $_{ov}$ were much higher than sigma $_{oc}$. The ratio of sigma $_{ov}$/sigma $_{oc}$ can be used to determine the shear diameter and the degree of structure of a suspension. Energy dissipation due to viscous drag was also higher for the structured suspensions than for the US suspensions. The results suggest that some trends observed with rheological properties of nonfood suspensions may not be applicable to structured food suspensions. AS

2413

Bobek (P), Ginter (E), Jurcovicova (M), Ozdin (L), Cerven (J), Babala (J). **Effect of dehydrated apple products on the serum and liver lipids in Syrian hamsters.** *Die Nahrung* 34(9): 1990: 783-789

The effect of two dehydrated apple products (10% in diet) - apple pulp (crude fibre 3.5%, pectin 1.4%) and apple pomaces (crude fibre 13.5%, pectin 7%) - on the serum and liver lipids of growing Syrian male hamsters were studied. The animals were fed a natural diet (38% of energy substituted by milk fat: the diet contains 53 mg of cholesterol (CH) per 100 g) which resulted in an accumulation of CH and triacylglycerols (TG) in the serum as well as in the liver, and CH-rich very low density lipoproteins (VLDL) in the circulation. After two months both apple products decreased the levels of CH and TG in serum (by 40 - 70%) and the content of CH in VLDL with similar efficiency. Both products reduced CH content in the liver, and the apple pulp also decreased TG content. Upto the 6th month the apple pulp studied suppresses accumulation of CH and TG in both the serum and the liver. A complete analysis of lipoproteins of main density class at that time showed that the decrease of serum CH and TG to a decisive extent is due to the decrease of their concn. in VLDL (by more than 50%). Therefore, the concn. of VLDL and the whole lipoprotein pool decreased by 50%. The apple pulp doubled the amount of CH transported by HDL. Three months after the replacement of butter in the diet by corn germ oil the CH and TG levels in the serum and TG also in the liver decreased to the physiological level. The apple pulp kept a higher level of the CH transport in HDL and decreased the CH content in the liver. AS

Ciders

2414

Hubert (C), Brunerie (P), Le Quere (JM) and Drilleau (JF). **Volatile aroma compounds of ciders: Rapid extraction and analysis.** *Sciences Des Aliments* 10(3): 1990: 603-618 (Fr)

Grapefruits

2415

Yanez (MG), Arteaga (AG), Miranda (JF), Paradoa (A), Sampere (E), Castillo (E), Serrano (G). **Stability of vitamin C content in grapefruits treated with gamma-irradiation.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 409-415 (Es)

The stability of vitamin C content of gamma irradiated grapefruits of "Marsh" var. at doses between 0.25 - 1.5 kGy was studied during 72 days storage at 12 - 15 C to establish the best levels of gamma-irradiation without significant losses of vitamin C. Total soluble solids, total acidity and pH were analyzed at the end of the storage period. A tendency for the vitamin C content, soluble solids and acidity to decrease as well as a tendency for the pH to increase with an increment of the radiation dose was observed. The only group of grapefruits that showed no significative losses in vitamin C content during 72 days storage at 12 - 15 C was the group treated with 0.25 kGy dose. Grapefruits may be irradiated at 0.35 kGy for storage up to 21 days. AS

2416

Goldman (A). **Effect of seal packaging on consumer evaluation of grapefruit.** *Journal of Food Quality* 12(5): 1989: 383-392

The effect of sealing grapefruit in plastic film of low density polyolefin on consumer's evaluations of the taste of grapefruits was studied. Consumers evaluated 5 different treatments of grapefruit: (1) sealed, packing house treated, waxed, (2) sealed, packing house treated without being waxed, (3) packing house treated, not sealed, (4) washed, field-run not waxed and not sealed, (5) the same as (1) above with the sealing removed just before the evaluation studied. The results indicate that sealing works best with grapefruit which are not waxed and that sealing does not negatively affect the sensory quality of grapefruit. Sealing conveys positive information to consumers about the fruit and enhances its taste image. AS

Grapes

2417

Doneche (B). **Metabolism of tartaric acid of grape berry by *Botrytis cinerea*.** *Sciences Des Aliments* 10(3): 1990: 589-602 (Fr)

Jackfruits

2418

Bhat (AV) and Pattabiraman (TN). **Protease inhibitors from jackfruit seed (*Artocarpus integrifolia*).** *Journal of Biosciences* 14(4): 1989: 351-365

Olives

2419

Amiot (M-J), Tacchini (M), Fleuriet (A) and Macheix (JJ). **The technological debittering process of olives: Characterization of fruits before and during alkaline treatment.** *Sciences Des Aliments* 10(3): 1990: 619-631 (Fr)

Ultra-violet spectrophotometry analysis allows the estimation of oleuropein levels, the bitter element of olives, with results close to those obtained by HPLC. The spectrophotometric method allows the confirmation of the great differences between the fruits of the 11 var. studied and their physiological stages. Oleuropein content is connected negatively with the fruit size. The kinetics of the debittering process are analysed, on the one hand in fruits, by soda penetration and by HPLC detn. of the ratio dihydroxyphenylethanol/oleuropein, and on the other hand, in lye sol. by spectrophotometry and titrimetry. These results should allow the modelling and optimizing of the debittering process according to the degree of maturity of the fruits before treatment and of the optimal quality of correctly debittered olives. AS

Papaya

2420

Chan (HTJr). **Ripeness and tissue depth effects on heat inactivation of papaya ethylene-forming enzyme.** *Journal of Food Science* 56(4): 1991: 996-998

Effects of time and temp. on papaya ethylene-forming enzyme (EFE) activity in the exocarp, mesocarp and endocarp of papayas at the 4 ripeness stages on a semi-logarithmic plot were obtained. Biphasic plots were obtained for heat inactivation of EFE. This indicated the presence of two forms of EFE, a heat resistant EFE (HREFE) and a heat sensitive EFE (HSEFE). The stabilities of enzymes presented as D-values showed EFE in the mesocarp and endocarp as more heat sensitive than EFE in the exocarp. THe effects of tissue depth and fruit ripeness on ion leakage showed that in the inner tissues ion leakage increased with fruit ripeness and the endocarp showed greatest amount of leakage among the three tissues. Ion leakage within the mesocarp increased greatly in papayas that were more than 1/4-ripe. Ion leakage increased concomitantly with increased mesocarp and endocarp ripeness conforming that papayas ripen differentially from the innermost tissues outwards. The membrane integrity, determined by ion leakage and influenced by ripeness, had an effect on heat sensitivity of EFE. SRA

Persimmon

2421

Forbus (WRJr), Payne (JA) and Senter (SD). **Nondestructive evaluation of Japanese persimmon maturity by delayed light emission.** *Journal of Food Science* 56(4): 1991: 985-988

Japanese persimmon cvs (3 nonastringent, Fuyu, Jiro and Ichi Kijiro and 2 astringent, Aizumi Shiraza and Giambo) were evaluated during maturation for changes in delayed light emission (DLE) and physical and chem. properties relating to maturity. Firmness, chlorophyll and DLE decreased during ripening and Hunter a values, soluble solids and β-carotene increased. For all cvs the relationship between DLE and maturity, indicated by calculated maturity index, was linear and negative. High correlations between DLE and maturity indicated that DLE has high potential for use as a rapid, nondestructive technique for estimating persimmon maturity. AS

2422

Senter (SD), Chapman (GW), Forbus (WRJr) and Payne (JA). **Sugar and nonvolatile acid composition of persimmons during maturation.** *Journal of Food Science* 56(4): 1991: 989-991

Sugars and nonvolatile acids of Japanese persimmons were identified and quantitated by GLC as oxime-TMS derivatives. Sugars quantitated were arabinose, galactose, glucose, fructose and sucrose. Fructose, glucose and sucrose were predominant and present in all cvs from mature green to fully ripe. Quantities of all sugars varied significantly by cv and maturity. Nonvolatile acids quantitated were succinic, malic, citric and quinic. Malic was the predominant acid in all cvs followed by citric. Quantities of malic increased with maturity; citric decreased. Sorbitol and inositol were present in minor quantities and varied significantly by cv and maturity stage. AS

2423

Assil (HI), Sterling (R) and Sporns (P). **Crystal control in processed liquid honey.** *Journal of Food Science* 56(4): 1991: 1034-1037, 1041

All samples studied were supersaturated with glucose, (>30%). The glucose/water and glucose/fructose ratios of the processed samples were consistent. The crystallization of these samples could be delayed by filling containers while the product was more than 45 C. Moisture losses were noted in plastic containers and this could contribute to crystallization. SRA

2424

Cao (Y), Dickinson (E) and Wedlock (DJ). **Creaming and flocculation in emulsions containing polysaccharide.** *Food Hydrocolloids* 4(3): 1990: 185-195

The influence of ionic polysaccharides on the stability of hydrocarbon oil-in-water emulsions made using sodium caseinate as emulsifier has been investigated at neutral pH. The 4 polymers studied were two microbial polysaccharides, xanthan gum and succinoglycan, and 2 carboxymethylcelluloses of high viscosity (CMC7HOF) and medium viscosity (CMC7MF). In each case, the presence of a small concn. of polymer produced a large increase in creaming, as indicated by the rate of serum separation observed visually. Increasing the polymer concn. led to improved creaming stability due to the rheological effects of the polymer in the continuous phase. The relative stabilizing abilities of the polysaccharides lie in the order: succinoglycan >xanthan gum >> CMC7HOF > CMC7MF. Complementary turbidity fluctuation measurements provide evidence for emulsion droplet flocculation in the presence of all 4 anionic polysaccharides. The effects of ionic strength on creaming and flocculation were investigated: the results confirm the general destabilizing effect of polysaccharides on food emulsions at low concn. The extent to which the phenomenon may be generally ascribed to depletion flocculation, as opposed to some kind of bridging flocculation, is discussed in the light of other recent experimental observations. AS

2425

Walter (RH) and Talomie (TG). **Quantitative definition of polysaccharide hydrophilicity.** *Food Hydrocolloids* 4(3): 1990: 197-203

The increase in volume of a number of chain polysaccharides was measured with the aid of the density equation as a function of increasing concn. of polysaccharide. The hydrocolloids were carboxymethylcellulose, sodium alginate, a low-methoxy and a high-methoxyl pectin, methylcellulose and guar gum. From the change of volume (converted to wt.) of dispersion/g added polysaccharide/100 g dispersion, a quantity defined as the hydrophilicity (H) was derived. On a molar basis, $H_m = 5.56 \times 10^{-3} \times H \times M$ kg, where M is the polysaccharide mol. wt. The magnitude of H was a property of the particular hydrocolloid, in every instance being substantially larger in pure water than in an electrolyte solution. AS

2426

Castelain (C), Renard (D), Bronnec (I) and Laroche (M). **Stability of lecithin-stabilized emulsions in the presence of sucrose or hydroxyethylcellulose.** *Food Hydrocolloids* 4(3): 1990: 205-214

The stability of lecithin-stabilized oil-in-water emulsions as a function of oil phase volume fraction in the range 0.011 - 0.766 was checked by studying creaming and measuring distribution of droplet diameter at ages between 1 day and 6 months. Emulsions with lower oil volume fractions were found to be more flocculated (and then creamed faster) but more stable towards coalescence than emulsions with higher oil volume fractions. The effects of adding sucrose or a non-gelling polymer (hydroxymethycellulose) in the aqueous phase were studied over a 1 month period. The addition of sucrose improved stability of the emulsions towards coalescence, flocculation and creaming, whereas the addition of polymer improved stability towards coalescence but led to a net increase in the degree of flocculation and then a destabilization versus creaming. These results could be related to a depletion phenomenon in the emulsions in the presence of polymer. AS

2427

Huber (GR). **Carbohydrates in extrusion processing.** *Food Technology* 45(3): 1991: 160-161, 168

Carbohydrate classification and its functionality in extrusion-processed foods is discussed in this article. Aspects covered are: extruders and carbohydrates (fibres, starches, hydrolloids and sugars). CSA

2428

Reineccius (GA). **Carbohydrates for flavour encapsulation.** *Food Technology* 45(3): 1991: 144-146, 149

The article focusses on the carbohydrates used in the encapsulation of flavours via spray drying. The strengths and weaknesses of maltodextrins, corn syrup solids, modified starch and gum acacia in flavour encapsulation have been discussed. CSA

Confectionery

2429
Appl (RC). **Confectionery ingredients from starch.** *Food Technology* 45(3): 1991: 148-149

Aspects discussed are corn syrups, high-maltose syrups, corn syrup solids, high-fructose corn syrup, high-fructose products, maltodextrins, dextrose, hydrogenated glucose syrup and polydextrose. CSA

2430
Minson (E). **Cookie confectionery combinations.** *Manufacturing Confectioner* 70(5): 1990: 121-126

The type of cookies which are formulated with confectionery ingredients such as chocolate liquor, cocoa, chocolate/compound coatings, caramel are briefly described. The process of enrobing and problems involved are also described. The packaging required, storage and distribution are mentioned. SYR

2431
Olinger (PM). **Sweetening the sugar-free challenge.** *Manufacturing Confectioner* 70(5): 1990: 127-131

The properties and applications of multiple bulk sweeteners (xylitol, sorbitol, mannitol maltitol syrups and polydextrose) are briefly described. The advantage of these polyols is their non-cariogenic property. But the limiting factor in usage of these sweeteners is their high cost. These sweeteners vary greatly in terms of sweetness, solubility, viscosity, hygroscopicity, heat of solution, cost and dental benefit. By combining these sweetness, the confectionery industry can supply the consumer with dentally safe alternatives to sugar-sweetened confections. SYR

Chocolates

2432
Saguy (IS) and Graf (E). **Particle size effects on the diffuse reflectance of a sucrose-caramel admixture.** *Journal of Food Science* 56(4): 1991: 1117-1118, 1120

2433
Urbanski (J). **White chocolate and confectioner's coatings.** *Manufacturing Confectioner* 70(1): 1990: 67-70

The manufacture and physical characteristics of white chocolate coatings and their handling problems are briefly described. Some of the advantages of white confectioner's coatings are also mentioned. Nutritional profile and some recipes for white coatings are given. SYR

2434
Seguine (ES). **Bloom and its prevention in the bakery.** *Manufacturing Confectioner* 70(1): 1990: 61-65

2435
Seguine (ES). **Proposed chocolate standards reformulation considerations.** *Manufacturing Confectioner* 69(11): 1989: 45-51

2436
Jaffery (MS). **Aerated/moulded chocolate.** *Manufacturing Confectioner* 69(11): 1989: 53-56

Chocolate aeration is an important way of modifying the texture of chocolate. Methods include the vacuum process, the dissolved gas process, entrapped air/gas in a crystallized fat phase, extrusion and reverse phase aeration. SYR

2437
Beckett (ST). **Chocolate coated rework.** *Manufacturing Confectioner* 70(5): 1990: 113-119

Due to manufaturing errors, some chocolate coated products may be classed as re-work. The categories ideal for some form of chocolate recovery process include badly or wrongly coated products, products having little chocolate not meeting wt. declaration and the products which developed fat bloom on surface. The types of centres where re-work can arise, the processes of recovering the coating and the difficulties arise with use of re-work are briefly described. SYR

2438
Irwin (WE). **Sugar substitutes in chocolate.** *Manufacturing Confectioner* 70(5): 1990: 150-154

The properties of isomalt palatinit and its use in low-calorie chocolate products are described. Its regulatory status is also mentioned. SYR

Cocoa butter

2439

Hogenbirk (G). **The influence of milk fat on the crystallization properties of cocoa butter and cocoa butter alternatives.** *Manufacturing Confectioner* 70(5): 1990: 133-140

The influence of milk fat on the crystallization behaviour of cocoa butter and cocoa butter alternatives, hardness, gloss and gloss stabilty of chocolate, the mouth feel and finess of chocolate are described. Analytical and organoleptic tests show that milk fat has a crystallization retarding effect when added in a chocolate, converture, compound or coating recipe. Hydrogenated and fractionated palm kernel fat has an acceptable hardness and fast crystallization speed even at higher milk fat levels. SYR

Cocoa powder

2440

Tarka (SMJr), Morrissey (RB), Apgar (JL), Hostetler (KA) and Shively (CA). **Chronic toxicity/carcinogenicity studies of cocoa powder in rats.** *Food and Chemical Toxicology* 29(1): 1991: 7-19

Cocoa powder (CP) was fed at levels of 0.0 (control), 1.5, 3.5 and 5.0% for 104 wk to male and female Sprague-Dawley rats derived from the F_{3b} generation of a multigeneration study using the same CP diets. Initial methylxanthin intake was high in all treatment groups, but steadily declined until wk 26. The high dose level provided a mean methylxanthine intake of approx. 57 mg/kg body wt./day for males and 74 mg/kg body wt./day for females from wk 26 to wk 104 of the study. Compared with controls, the historical trend of methylxanthin-associated growth stimulation was evident in rats consuming diets containing 1.5% CP, while body wt. was reduced in rats consuming diets containing 3.5 and 5.0% CP. Survival rates were similar in control and CP-fed rats. No evidence of treatment-related clinical disease or ocular effects was noted. An increased incidence of bilateral testicular atrophy and aspermatogenesis was present in males consuming diets containing 5.0% CP. Non-suppurative myocarditis and intertistial fibrosis of the heart were also increased in incidence in both sexes receiving diets containing 5.0% CP. The overall incidences of both pelvic dilatation and renal pelvic microcalculi were increased in most treatment groups. Although there was no difference in the incidence of benign mammary gland fibro adenomas in female rats between the control group and any CP-fed group, a marginally significant (P = 0.04) trend test was apparent. The significance of this finding is doubtful, since the incidence of this lesion in the highest dose group was well within the historical control range for this strain of rats. No evidence of carcinogenicity from dietary CP was found in either sex. AS

Starch

2441

Boki (K) and Ohno (S). **Equilibrium isotherm equations to represent moisture sorption on starch.** *Journal of Food Science* 56(4): 1991: 1106-1107, 1110

2442

Hebeish (A), Khalil (MI) and Hashem (A). **Carboxymethylation of starch and oxidized starches.** *Starch/Starke* 42(5): 1990: 185-191

Research was designed to tailor polymeric materials for specific utilization, namely sizing of cotton textiles by making use of maize starch and rice starch. Hence both starches were subjected independently to oxidation with potassium persulphate to obtain starches with different molecular sizes. The original starches and the oxidized starches were then partially carboxymethylated with monochloroacetic acid under the catalytic influence of sodium hydroxide. In this way the mol. structure of starch, i.e., the mol. wt. of the polymeric backbone and substituents present thereon, could be controled. Results signify the following: (a) persulphate oxidation yields mixed type (acidic/reducing) of oxidized starch since the later contains both carbonyl and carboxyl groups; (b) the extent of oxidation relies on the severity of the conditions used but it is certain that maize starch is more susceptible towards oxidation than rice starch due mainly to structural differences; (c) oxidation of starch prior to carboxymethylation enhances the amenability of starch to carboxymethylation regardless of the kind of starch used and; (d) when applied as sizing agents, carboxymethyl starches derived from oxidized starches proved to be the best and the original starches the least while oxidized starches stood in mid-way position. AS

2443

Tsuge (H), Hishida (M), Iwasaki (H), Watanabe (S) and Goshima (G). **Enzymatic evaluation for the degree of starch retrogradation in foods and foodstuffs.** *Starch/Starke* 42(6): 1990: 213-216

The simple, enzymatic evaluation procedure for the degree of starch retrogradation, which is applicable to the complex foods in the food industry, was proposed. This procedure includes the digestion of gelatinized starch by *Bacillus subtilis* α-amylase, which can only attack the gelatinized starch, and

then the residual non-digestible starch was determined colorimetrically with iodine. The presence of considerable amounts of ingredients, i.e. 30% sucrose, 20% NaCl or 30% casein did not interfere with the detn. However, the values were positively biased by the presence of more than 0.5% of lecithin. Preliminary digestion by 0.2% actinase E for 16 h at 37 C and subsequent dialysis against large volume of distilled water were adopted to avoid the erroneous results due to the interference with ingredients. AS

2444

Patel (MV), Raval (DK), Patel (RG) and Patel (VS). **Modification and characterization of *Leucaena glauca* seed gum by graft copolymerization with acrylonitrile.** *Starch/Starke* 42(6): 1990: 226-229

The suitable conditions for graft copolymerization of acrylonitrile on to *Leucaena glauca* seed gum in aqueous system were investigated using hydrogen peroxide as initiator. For the purpose, a series of reactions have been carried out at different reaction conditions which cover the range of hydrogen peroxide concn. (5 - 20 mmole/l), acrylonitrile concn. (0.05 - 0.25 mole/l), backbone concn (0.00617 - 0.03086 AGU) and polymerization time (30 - 180 min). The grafting temp. was kept at 85 C for all reactions. The products have been characterized by various methods including viscometry, spectrophotometry and thermometry. AS

2445

Timmermann (EO) and Chirife (J). **The physical state of water sorbed at high activities in starch in terms of the GAB sorption equation.** *Journal of Food Engineering* 13(3): 1991: 171-179

A refinement of the Guggenheim-Anderson-de Boer (GAB) sorption model which allows for the existence of a third sorption stage, was used to analyze the behaviour of adsorption isotherms of starches at very high water activity (a_w). The results of experimental isotherm analysis with the new model revealed that above about $a_w = 0.90$ a change in the physical state of adsorbed water in starch occurred; i.e. the water molecules would be more 'liquid-like' than in the preceding layers. This transition corresponds with the unfreezable water content in starch, as determined by others. AS

Sugar

2446

Gonzalez-Blanco (P), Saucedo-Castaneda (G) and Viniegra-Gonzalez (G). **Protein enrichment of sugarcane by-products using solid-state cultures of *Aspergillus terreus*.** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 70(5): 1990: 351-354

Solid state cultures of *Aspergillus terreus* were carried out at different temp. using sugarcane trash blended with salts and undiluted molasses. A phase of respiration related to spore germination was observed. The effect of temp. on mold growth was evaluated in terms of lag phase, μmax and Xmax values. The germination phase was more sensitive to temp. changes than the apical growth phase. Satisfactory protein content (9 - 10% dry matter) and protein yield (23% of spent sugars) were observed when the temp. was regulated within a medium range (25 - 35 C). Preliminary data for scaling-up studies regarding temp. distribution and CO_2 evolution are presented. AS

BAKERY PRODUCTS

2447

Hegazy (NA) and Faheid (SMN). **Rheological and sensory characteristics of doughs and cookies based on wheat, soybean, chickpea and lupine flour.** *Die Nahrung* 34(9): 1990: 835-841

Levels of 5, 10 and 15% of legume flours i.e. soybean, lupine and chickpea were used to supplement cookie. The effect of this supplementation on the rheological properties of the resulting dough was investigated using farinograph and extensograph as objective methods for quality assessment of the final product. It was found that there was an increase in water absorption capacity, dough stability, arrival time, dough development time and mix tolerance index. Extensograph results indicated that dough resistance to extension, dough energy and proportional number were minimized with increasing the lupine flour in the formula, while it was not changed on dough extensibility. However, soy flour increased resistance to extension, proportional number and energy and diminished dough extensibility. At the same time supplementing wheat flour with chick peas decreased both dough resistance to extension and proportional number while it increased dough extensibility and energy. For sensory evaluation, it was found that using either until 5% soybean or 10% chick pea or 15% lupine flour could replace the wheat flour in cookies formula without adversely affecting baking performance or altering the physical characteristics of the end product. AS

2448

Kulp (K), Lorenz (K) and Stone (M). **Functionality of carbohydrate ingredients in bakery products.** *Food Technology* 45(3): 1991: 136, 138-140, 142

Functionality of carbohydrates in bakery foods (white pan bread, layer cakes and cookies) are discussed. Aspects covered in this article are sweetener functionality: sweetener in bread, cake (substitution of sucrose by other sweeteners, required adjustments when using HFCS), cookies: starch, staling, high-fiber products and substitutes. CSA

Bread

2449

Yue (P), Hettiarachchy (N) and D'Appolonia (BL). **Native and succinylated sunflower protein use in bread baking.** *Journal of Food Science* 56(4): 1991: 992-995, 998

5% blends of Hard Red spring wheat flour/chlorogenic acid-free native and succinylated sunflower protein conc./isolate resulted in acceptable bread loaves. Quality of loaves deteriorated at 10 and 15% blends and potassium bromate did not improve bread quality. Loaves with 5 and 10% blends of succinylated sunflower proteins had over-fermented characteristics. Reduced fermentation times did not improve bread quality at 5% level but improved vol. at the 10% level. SRA

Chapathi

2450

Gupta (TR). **Specific heat of Indian unleavened flat bread (chapathi) at various stages of cooking.** *Journal of Food Process Engineering* 13(3): 1990: 217-227

A simple inexpensive calorimeter was built to measure specific heat of foods at various process temp. By using vegetable/mineral oil as the heating medium in place of water, specific heat at temp. beyond 100 C can also be evaluated. Specific heat of whole wheat dough and chapathi (round disc prepared mostly from whole wheat flour dough) at various stages of cooking and puffing were determined. Based on the experimental data a linear equation ($C = 2476.56 + 23.56M - 3.79T_c$) is proposed from the experimental data for specific heat of wheat flour, dough, cooked and puffed chapati and for other food materials at moisture levels ranging from 0.1 - 80% and temp. ranges from 303 - 336 K. AS

2451

Kim (SM) and Zayas (JF). **Effects of ultrasound treatment on the properties of chymosin.** *Journal of Food Science* 56(4): 1991: 926-930

When chymosin was extracted by ultrasound curd tension and syneresis were significantly lower for Berridge substrate coagulated by the ultrasound-treated chymosin than by the control. Experimental chymosin had a shorter induction period and was more heat-sensitive than the control. Activation energy of chymosin obtained by ultrasound treatment was significantly lower than that of the control. Ultrasound treatment did not significantly change the chromatographic patterns of chymosin. Only two distinct enzymatically active proteins were observed with DEAE-cellulose chromatography. Electrophoretic properties were similar for chymosins obtained by ultrasound and control methods. AS

2452

Hegazi (FZ) and Abo-Elnaga (IG). **Dissimilation of organic acids by dairy lactic acid bacteria.** *Die Nahrung* 34(9): 1990: 791-801.

Milk

2453

Xiong (YL), Aguilera (JM) and Kinsella (JE). **Emulsified milkfat effects on rheology of acid-induced milk gels.** *Journal of Food Science* 56(4): 1991: 920-925

Reconstituted skim milk formed by a gel by acidification to < pH 5.2 and heating to 60 C. The gel compressive stress (σ_c) was influenced by the heating process, increased with milk-nonfat-solids (MNFS) and reached a max. at pH 4.0. The addition of emulsified fat facilitated gelation, increase gel sigma $_c$ and shear modulus, and decreased gel deformability. At an equal fat concn., emulsions containing small-sized fat globules (i.e., more globules) reinforced the gels more markedly than emulsions comprised of large globules reflecting the importance of number of globules in the gels. Electron micrographs revealed crosslinkages between fat globules and casein particles in the gel network, which may have caused reinforcement of milk gels by milkfat. AS

2454

Kudra (T), Van De Voort (FR), Raghavan (GSV) and Ramaswamy (HS). **Heating characteristics of milk constituents in a microwave pasteurization system.** *Journal of Food Science* 56(4): 1991: 931-934, 937

A simple lab. scale microwave system for continuous heating of biological fluids (water, cream and milk) has been described, and the heating characteristics for milk and its constituents in solution is determined as functions of flow rate and power using water greater than or equal to 75 g/min. This system worked well and could rapidly heat water, milk and creams to any desired temp. below 100 C, controlled by flow rate. Operation at power settings other than 100% caused major temp. oscillation and were unsuitable for maintaining a selected temp. Milk heated significantly faster than water and protein was the major contributor to heating, effect of fat and lactose being negligible. This simple continuous microwave heating system can be used for pasteurization of milk or cream, assuming an adequate holding time. SRA

2455

Cormier (F), Raymond (Y), Champagne (CP) and Morin (A). **Analysis of odour-active volatiles from *Pseudomonas fragi* grown in milk.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 159-161

Pseudomonas fragi produced a pleasant strawberry-like odour when grown in skim milk at 15 C. Volatiles from the culture broth were extracted and enriched by using a purge and trap method and analyzed by using sniffing FID-GC. FID revealed the presence of approx. 90 compounds. Concomitant olfactory analysis of the eluted compounds demonstrated that 26 were odour-active. Ethyl butyrate, ethyl 3-methylbutanoate, and ethyl hexanoate were the major contributors to the odour, while other compounds contributed to its complexity and richness. AS

2456

Madkor (SA) and Fox (PF). **Plasmin activity in buffalo milk.** *Food Chemistry* 39(2): 1991: 139-156

2457

Jerez (JJR), Martinez (JY), Ventura (MTM) and Marteache (AH). **Differences in level of contamination by psychrotrophic microorganisms and psychrotrophic enterobacteria in refrigerated pasteurized milk in various types of packaging.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 397-402 (Es)

A study has been made of the evolution of the flora of psychrotrophic microorganisms and particularly enterobacteria in refrigerated pasteurized milk during the commercialization period. Influence of the type of container employed on the counts of these groups of microorganisms has also been studied. During the commercialization period (4 days) the level of contamination was affected by the packaging systems: psychrotrophic organisms did not increase in the samples packed polyethylene bags whereas those in the carton containers showed a significant increase. AS

Milk products

2458

Karleskind (D), Laye (I), Halpin (E) and Morr (CV). **Improving acid production in soy-based yoghurt by adding cheese whey proteins and mineral salts.** *Journal of Food Science* 56(4): 1991: 999-1001

The inability of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* yoghurt culture to prepare lactic acid and flavour in soy-based yoghurt made with isolated soy protein (ISP) and soy milk (SM) were studied. Partial replacement of ISP with fresh cheese whey or whey protein isolate, or addition of phosphate and citrate ions resulted in physical stability defects in soy-based yoghurt; and failed to improve acid and flavour development or provide a 1:1 number concn. ratio of the two culture bacteria types. SM-based yoghurt had lower acid development than ISP-based yoghurt. Addition of commercial sodium caseinate stimulated acid developemnt in SM-based yoghurt. SRA

2459

Hittu Matta, Kalra (MS) and Ajit Singh. **Survival of pathogenic bacteria in *Yoghurt* and *Dahi*.** *Journal of Food Science and Technology (India)* 28(4): 1991: 240-243

The survival rates of *Salmonella typhimurium*, *Yersinia enterocolitica* and *Campylobacter jejuni* in yoghurt and dahi stored at 5 - 7 C or 37 C were determined. Changes in titratable acidity and pH were also measured in these fermented milks. During storage, the lactic acid per cent increased from 0.6 to 1.1 in yoghurt and 0.46 to 0.95 in dahi after 48 h. None of the pathogens survived in dahi/yoghurt stored at 37 C for more than 25 h. However, a few survivors were still present even after 48 h storage at 5 - 7 C. D values for all the pathogens ranged from 4.0 to 5.5 h. AS

Cheese

2460

Mojarro-Guerra (SH), Amado (R), Arrigoni (E) and Solms (J). **Isolation of low-molecular-weight taste peptides from Vacherin Mont d'Or cheese.** *Journal of Food Science* 56(4): 1991: 943-947

Cheddar cheese

2461

Abboudi (MEl), Pandian (S), Trepanier (G), Simard (RE) and Lee (BH). **Heat-shocked lactobacilli for acceleration of Cheddar cheese ripening.** *Journal of Food Science* 56(4): 1991: 948-949, 953

Cells of lactobacilli were heat-treated at 65, 67 and 70 C for 22 sec to supress lactic acid production without damaging the proteolytic enzyme system important for cheese maturation. The best combination for max. retardation of lactic acid production and min. damage to the proteolytic system was obtained by treating cells at 67 C for 22 sec, which gave a cell mortality of 97.7%, a lag phase in lactic acid production of 24 h, and limited inactivation of proteolysis. SRA

Gouda cheese

2462

Bester (BH) and Lombard (SH). **Influence of lysozyme on selected bacteria associated with gouda cheese.** *Journal of Food Protection* 53(4): 1990: 306-311

The germination of *Clostridium tyrobutricum* spores; the growth of vegetative cells of *C. tyrobutyricum*; and the growth of 4 cultures each of lactobacilli, coliform bacteria and cheese starter cultures were studied in culture media containing various levels of lysozyme. Lysozyme was found to inhibit vegetative growth of both isolates (BZ15 and C611) of *C. tyrobutyricum* at concn. equal to and greater than 250 units/ml. Spore germination was stimulated by lysozyme with max. stimulation at 250 units/ml. This effect was more evident with the slower germinating strain, C611. One *Lactobacillus* isolate was not affected by lysozyme while the other three isolates were inhibited by 500 to 1000 units/ml of lysozyme, but were not affected by lower concn. The activity of the 4 starter cultures was not affected by lysozyme concn. of up to 2500 units/ml. Growth of 3 coliform isolates was inhibited by 1000 units/ml of lysozyme, but was not significantly affected by lower concn. of the enzyme. Growth of the fourth coliform isolate was stimulated by lysozyme at all the concn. used in the experiments. AS

Mozzarella cheese

2463

Kindstedt (PS) and Fox (PF). **Modified Gerber test for free oil in melted Mozzarella cheese.** *Journal of Food Science* 56(4): 1991: 1115-1116

Milk powder

2464

Lopez-Bajonero (LJ), Lara-Calderon (P), Galvez-Mariscal (A), Velazques-Arellano (A) and Lopez-Munguia (A). **Enzymatic production of a low-phenylalanine product from skim milk powder and caseinate.** *Journal of Food Science* 56(4): 1991: 938-942

Skim milk powder and commercial casein were used as raw materials. Enzymatic hydrolysis involved a 5-h treatment with a protease from *Aspergillus oryzae* followed by papain hydrolysis for 21 h to liberate 16.5 mg phenylalanine/g protein. Removal of phenylalanine from the hydrolysate was by physical adsorption onto activated carbon: 3g carbon/g casein removed 92% of the total phenylalanine. After evaporation, the mixture of peptides was mixed with butter oil and other ingredients, homogenized and spray-dried. The product was then formulated with essential nutrients, as well as tryptophan, histidine, tyrosine and methionine which were lost due to nonspecific adsorption. AS

Rasogolla

2465

Suresh Kumar and Kapoor (CM). **Utilization of cow milk casein in rasogolla preparation.** *Journal of Food Science and Technology (India)* 28(4): 1991: 253-254

Chhana can easily be replaced by 100% with casein obtained from skimmed cow's milk and vegetable oil without having adverse effects of the quality of the product. The acceptability of the product at 100% level (L 5) was better than the product made from chhana. The yield of rasogolla was between 4.0 and 6.2 kg from 1 kg mixture of chhana and casein. The yield was max. at 100% (L 5) and min. at 50% (L 3) level. AS

Wheys

2466

Singh (RK), Nielsen (SS) and Chambers (JV). **Lactose crystallization from whey permeate in an ethanol-water mixture.** *Journal of Food Science* 56(4): 1991: 935-937

A 30% conc. permeate of a whey ultrafiltration process was used for producing crystalline α-lactose monohydrate. Effect of pH (2.75 - 5.5 pH units) at solvent to solute ratio 10:1 v/w, agitation and seeding (0.004 - 0.02%) on rate of lactose crystallization were examined. Conditions which were favourable in terms of crytallized lactose yield, and time of crystallization were: pH 5.5, agitation with or without seeding and 22 C. The first-order reaction-rate constant for crystallization ranged from 0.0178 to 0.200 h^{-1} depending on conditions. AS

2467

Patocka (G) and Jelen (P). **Effects of pH and calcium on thermal behaviour of isolated whey proteins.** *Journal of Food Science* 56(4): 1991: 1119-1120

Whey proteins

2468

Xiong (YL) and Kinsella (JE). **The effect of pH, thiol reagent and time on properties of urea-induced whey protein gels.** *Food Hydrocolloids* 4(3): 1990: 245-248

Solutions of whey protein isolate (11.0% by wt.) in 6 mol/dm^3 urea spontaneously formed gels at 25 C. The gelling rate increased exponentially, but the gels became less elastic and more fragile, as the pH was increased from 7 to 10. The addition of N-ethylmaleimide at < 3 mmol/dm^3 increased gel strength, whereas gelation was inhibited above 5 mmol/dm^3. Gel strength increased by 25% during storage at 25 C for 7 days. AS

Milk proteins

Casein

2469

Kim (BY), Bringe (NA) and Kinsella (JE). **Effects of calcium anions on the rates of casein aggregation.** *Food Hydrocolloids* 4(3): 1990: 239-244

The additions of calcium chloride (Cl^-), nitrate (NO_3^-) and thiocyanate (SCN^-) (10 mmol/dm^3) reduced the rate of aggregation of casein in acidified skim milk in the order $NO_3^- > Cl^- > SCN^-$. Aggregation rates were accelerated by increasing temp. of skim milk but the magnitude was influenced by pH and ion species present. AS

2470

Murphy (JM) and Fox (PF). **Functional properties of α_s-k- or b-rich casein fractions.** *Food Chemistry* 39(2): 1991: 211-228

The functional properties of a β-casein-enriched and an α_{s^-}/k-casein-enriched fraction obtained from ultrafiltration of sodium caseinate were compared to those of sodium caseinate. The α_{s^-}/k-casein-enriched fraction compared favourably to sodium caseinate with respect to solubility, viscosity and water sorption. However, the surface activity of the fraction was adversely affected and consequently its foaming capacity, foam stability and emulsion capacity, were reduced, but emulsion stability was increased. The β-casein-enriched fraction was as soluble as sodium caseinate, was less viscous and had similar water sorption properties. The fraction was more surface active than Na caseinate and its foaming properties and emulsifying capacity were enhanced. However, emulsions formed from this fraction were less stable than emulsions prepared in either sodium caseinate or α_{s^-}/k-casein-enriched casein. AS

MEAT AND POULTRY

2471

Benedict (RC), Schultz (FJ) and Jones (SB). **Attachment and removal of *Salmonella* spp. on meat and poultry tissues.** *Journal of Food Safety* 11(2): 1991: 135-138

The mechanism of microbial attachment and release from muscle proteins from beef, pork, chicken were studied using *Salmonella*. Bacteria attach preferentially to connective tissue fibers, rather than to myofibrils. Mannose inhibited attachment slightly and isotonic saline rinses removed some attached cells. The apparent var. of attachment mechanisms by *Salmonella* hinders complete removal from meat tissues by simple rinsing procedures. KMA

Meat

2472

Faraji (H) and Decker (EA). **Inhibition of phosphatidylcholine liposome oxidation by porcine plasma.** *Journal of Food Science* 56(4): 1991: 1038-1041

2473

Desrosiers (MF). **Electron spin resonance for monitoring radiation-processed meats containing bone.** *Journal of Food Science* 56(4): 1991: 1104-1105

2474

Sanderson (JE), Consaul (JR) and Lee (K). **Nitrate analysis in meats: Comparison of two methods.** *Journal of Food Science* 56(4): 1991: 1123-1124

2475

Samoon (AH) and Sharma (N). **Studies on processing and preservation of *Goshtaba*.** *Journal of Food Science and Technology (India)* 28(4): 1991: 212-215

Effect of mutton-fat level, hot vs cold-boned meat and manual vs mincing was studied on the processing of *Goshtaba* (Kashmiri meat product). Incorporation of mutton-fat at 20% level in the emulsion was found optimum for *Goshtaba*; it could be prepared using chilled mutton. Sodium tripolyphosphate at 0.5% level improved product quality and the effect was more pronounced in samples made from cold boned meat with the use of machine than that of the hand minced. It was possible to store cooked *Goshtaba* samples for 7 days in low density polyethylene bags (0.25 μm thickness) at 4 plus or minus 1 C. AS

2476

Broekhuijsen (ML) and van Willigen (JD). **Psychophysical investigations into the tenderness of meat.** *Meat Science* 28(2): 1990: 159-170

Tenderness of 5 veal meat cuts was determined by two groups of subjects: a panel of skilled butchers and a consumers' panel. The butchers estimated tenderness with and without assistance of visual information. For the consumers a procedure to measure the oral sensation by a forced choice method of successive comparison was developed. It was shown that: imprecision of the opinions of the consumers was greater than that of the butchers: use of additional visual information did not affect the butchers' precision: and the butchers' views of tenderness had a poor relationship to the consumers' oral perception of this quality. AS

2477

Nishino (H), Tanaka (M) and Yokoyama (M). **The effect of different fats and starches on meat adhesion to casing.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(11): 1990: 1853-1857 (Ja)

The meat adhesion to casing was investigated using retort sterilized fish sausages to which different kinds of fat and starch were added. First, meat adhesion of sausages to which two kinds of fat were added separately was compared. Corn oil produced higher meat adhesion than pork fat. And in spite of kinds of fat, the degree of meat adhesion decreased with increase of additional quantity of fat. On the other hand, meat adhesion of suasages to which three kinds of starch were added separately was compared. Of these starches, potato starch gave the highest meat adhesion. And in case of corn starch, when its additional ratio to basic mixture of sausage as a hundred was 10, the degree of meat adhesion reached max. AS

2478

Johnson (JL), Doyle (MP) and Cassens (RG). ***Listeria monocytogenes* and other *Listeria* spp. in meat and meat products. A review.** *Journal of Food Protection* 53(1): 1990: 81-91

This paper reviews the prevalance of *Listeria* spp. in meat and meat products, analyses the potential for survival and growth of *Listeria* on fresh meats and during meat processing: and addresses the effect of various meat preservation parameters on *L. monocytogenes*. Covers *Listeria* sp. of importance, isolation of *Listeria* from meat and meat products, incidence and level of *Listeria* contamination, isolation of *Listeria* from poultry, serotype distribution, and control of *L. monocytogenes* by sanitizing agents. 89 references. SRA

2479

Rico (E), Toldra (F) and Flores (J). **Problems associated with the assay of cathepsin D in meat and meat products.** *Food Chemistry* 40(1): 1991: 87-91

Cathepsin D is usually assayed by following the release of the trichloroacetic (TCA)-soluble peptides from denatured haemoglobin at 280 nm, but some artefacts may appear giving false results. Cathepsin D activity has therefore been assayed under different conditions in muscle, liver and dry-cured ham extracts. Substantial errors (around 50 - 56%) become evident when using the classical standard assay. The assay of cathepsin D activity in muscle extracts should include the use of a blank containing a specific inhibitor such as isovalerylpepstatin. AS

2480

MacDonald (GA) and Lanier (T). **Carbohydrates as cryoprotectants for meats and surimi.** *Food Technology* 45(3): 1991: 150, 152-154, 156, 158-159

The myofibrillar component of fish muscle requires the inclusion of a cryoprotective component prior to freezing to ensure long-term stability of the proteins in frozen storage. This article reviews the addition of cryoprotective substances and their mechanisms of action in muscle. The various cryoprotective

additives (carbohydrate compounds, low-mol.-wt. polyols, amino acids, carboxylic acids, nucleotides, sucrose, sorbitol and polydextrose). Mechanisms of protein cryoprotection (low-mol.-wt. carbohydrates and high-mol.-wt. carbohydrates) and applications are also considered. 63 references. CSA

2481

Manu-Tawiah (W), Ammann (LL), Sebranek (JG) and Molins (RA). **Extending the colour stability and shelf-life of fresh meat.** *Food Technology* 45(3): 1991: 94, 96-98, 100-102

This study evaluates the effects of a colour-maintenance treatment on the quality and microbiological characteristics of fresh meat. The results of this study shows that the use of colour-maintenance compounds (tetrasodium pyrophosphate, sodium erythorbate and citric acid) has the potential to extend fresh meat colour in products (beef steaks or ground beef), but has a relatively lesser effect on pork chops. The microbial growth was unaffected by colour treatment in all cases. The modified atm. storage was effective in extending the shelf-life (10^7 cfu/cm^2 or g) for all products regardless of treatment. CSA

Beef

2482

Stalder (JW), Smith (GL), Keeton (JT) and Smith (SB). **Lactate dehydrogenase activity in bovine muscle as a means of determining heating endpoint.** *Journal of Food Science* 56(4): 1991: 895-898

In this study the influence of muscle pH in combination with increasing concn. of brine salts on lactate dehydrogenase (LDH) activity in meat slurries heated to different internal temp. is evaluated, muscle-to-muscle variations in LDH activity and the influence of sex and age on LDH activity is determined. Results of these studies showed that heating bovine semimembranous sample slurries to 63 C greatly reduced LDH activity under simulated processing conditions. At pH 4.8, it caused premature, non-temp. dependent loss of LDH enzyme activity. At pH 5.6 and temp. between 57 and 63 C the LDH activity decreased. At pH 6.4, at 60 C there was sharp decline in LDH activity. As salt and phosphate concn. increased, LDH activity decreased, and LDH activity varied between muscle-to-muscle. All the 4 major muscles comprising the top and bottom round had sufficient activity, above 1,200 U (μ mol/min/g of sample), to be suitable for rapid assay. Sex classification had no effect on LDH activity, but activity declined with increasing caracass maturity. However, LDH activity was present at a level (800 U) that would allow development of a rapid assay. SRA

2483

McMillin (KW), Bidner (TD), Felchle (SE), Dugas (SM) and Koh (KC). **Flavour and oxidative stability of ground beef patties as affected by source and storage.** *Journal of Food Science* 56(4): 1991: 899-902

2484

Crouse (JD), Koohmaraie (M) and Dickson (JS). **Storage and bacterial contamination effects on myofibrillar proteins and shear force of beef.** *Journal of Food Science* 56(4): 1991: 903-905

2485

Liu (MN), Huffman (DL), Egbert (WR), McCaskey (TA) and Liu (CW). **Soy protein and oil effects on chemical, physical and microbial stability of lean ground beef patties.** *Journal of Food Science* 56(4): 1991: 906-912

2486

Mitchell (GE), Reed (AW) and Rogers (SA). **Influence of feeding regimen on the sensory qualities and fatty acid contents of beef steaks.** *Journal of Food Science* 56(4): 1991: 1102-1103

2487

Okodugha (SA) and Aligba (LE). **Microbiological quality of raw beef from Irrua - Nigerian market retail table.** *Journal of Food Science and Technology (India)* 28(4): 1991: 244-245

A study of the microbiological quality of raw beef market samples was undertaken. Results showed that the total aerobic plate count (APC) ranged from Log $_{10}$ 6.11 - 6.65/g while the coliforms varied from log $_{10}$ 3.43 - 5.95/g mould and yeast counts ranged from log $_{10}$ 2.86 - 5.78/g. Bacterial genera isolated included *Micrococcus*, *Staphylococcus*, *Salmonella*, *Escherichia*, *Bacillus*, *Pseudomonas*, *Klebsiella*, *Proteus*, etc. The genera of moulds isolated were *Aspergillus*, *Penicillium*, *Sporotrichum* and *Mucor*. No yeasts were isolated from the raw meat samples. Incidence with which microorganisms occurred was 100% for *Pseudomonas*, *Salmonella*, *Aspergillus*, etc. The significance of some of the microorganisms isolated from the raw meat is discussed. AS

2488

Rao (MV) and Gault (NFS). **Acetic acid marinading - the rheological characteristics of some raw and cooked beef muscles which contribute to changes in meat tenderness.** *Journal of Texture Studies* 21(4): 1990: 455-477

2489

Andersen (HJ), Bertelsen (G) and Skibsted (LH). **Colour and colour stability of hot processed frozen minced beef. Results from chemical model experiments tested under storage conditions.** *Meat Science* 28(2): 1990: 87-97

2490

Miles (CA), Fursey (GAJ), Page (SJ) and Fisher (AV). **Progress towards using the speed of ultrasound for beef leanness classification.** *Meat Science* 28(2): 1990: 119-130

2491

Jones (SDM), Schaefer (AL), Robertson (WM) and Vincent (BC). **The effects of withholding feed and water on carcass shrinkage and meat quality in beef cattle.** *Meat Science* 28(2): 1990: 131-139

2492

Culioli (J), Bordes (P) and Dumont (R). **Influence of a trenbolone acetate on the composition and the ageing kinetics of the *Longissimus dorsi* muscle of cull cows.** *Sciences Des Aliments* 10(3): 1990: 533-542

2493

Yu (LSL) and Fung (DYC). **Evaluation of FDA and USDA procedures for enumerating *Listeria monocytogenes* in ground beef.** *Food Microbiology* 8(1): 1991: 69-74

The suitability of FDA and USDA-FSIS methods for isolating *Listeria monocytogenes* from meat samples was evaluated and examined. The enrichment broths tested were Fraser broth (FB), *Listeria* enrichment broth (LEB), University of Vermont (UVM) broth, and UVM with extra acriflavine (UVMA). The agar media used included modified McBridge agar (MMA), LiCl-phenylethanol-moxalactam (LPM) agar, modified Oxford (MOX) agar, and McBridge agar (MA) as a control. The performance of 16 combinations of enrichment broth and plating agar media was examined to recover three strains of *L. monocytogenes* from pure culture suspension and a slurry of inoculated fresh ground beef (10^2 - 10^4 cfu ml^{-1}). All media performed well; however, FDA-LEB combined with USDA-MOX agar was the most efficient for the detection of *L. monocytogenes* strains. AS

2494

Bruce (HL) and Ball (RO). **Postmortem interactions of muscle temperature, pH and extension in beef quality.** *Journal of Animal Science* 68(12): 1990: 4167-4175

2495

Whipple (G), Koohmaraie (M), Dikeman (ME) and Crouse (JD). **Predicting beef-longissimus tenderness from various biochemical and histological muscle traits.** *Journal of Animal Science* 68(12): 1990: 4193-4199

2496

Terry (CA), Knapp (RH), Edwards (JW), Mies (WL), Savell (JW), Cross (HR). **Yields of by-products from different cattle types.** *Journal of Animal Science* 68(12): 1990: 4200-4205

2497

Savell (JW), Cross (HR), Francis (JJ), Wise (JW), Hale (DS), Wilkes (DL), Smith (GC). **National consumer retail beef study: Interaction of trim level, price and grade on consumer acceptance of beef steaks and roasts.** *Journal of Food Quality* 12(4): 1989: 251-274

2498

Johnson (LP), Miller (MF) and Reagan (JO). **The effect of various levels of added sodium chloride and potassium chloride on the chemical, physical and sensory characteristics of precooked, recombined beef chuck roasts.** *Journal of Food Quality* 12(4): 1989: 275-282

Mutton

2499

Wu (WH), Rule (DC), Busboom (JR), Field (RA) and Ray (B). **Starter culture and time/temperature of storage influence on quality of fermented mutton sausage.** *Journal of Food Science* 56(4): 1991: 916-919, 925

Rate of acid production and ability to produce antimicrobial activity were tested on *Pediococcus acidilactici* H and *Lactobacillus plantarum* 27 during growth in a sausage formula mixture. Lactacel 75 was used as control. Starter culture did not affect water activity, pH, ash or protein content, fatty acid composition (except for nonadecanoate), cholesterol content or retention of moisture, protein, fat, ash or

fatty acids. Sausages made with *P. acidilactici* H had the lowest ($P < 0.05$) retention (89.6%) of cholesterol during processing and storage. Sensory evaluation of fermented sausage and bologna prepared from the two starter cultures or from Lactacel 75 indicated both products were acceptable after 50 - 60 days of storage at 4 C. AS

Pork

2500

Greer (GG) and Murray (AC). **Freezing effects on quality, bacteriology and retail-case life of pork.** *Journal of Food Science* 56(4): 1991: 891-894, 912

2501

Ziprin (YA), Rhee (KS) and Davidson (TL). **Characteristics of pork products from swine fed a high monounsaturated fat diet: Part 3. A high-fat cured product.** *Meat Science* 28(2): 1990: 171-180

2502

Johnson (LP), Reagan (JO), Haydon (KD) and Miller (MF). **The prediction of percentage of protein in pork carcasses.** *Journal of Animal Science* 68(12): 1990: 4176-4184

2503

Johnson (LP), Miller (MF), Haydon (KD) and Reagan (JO). **The prediction of percentage of fat in pork carcasses.** *Journal of Animal Science* 68(12): 1990: 4185-4192

2504

Wu (CK), Ramsey (CB) and Davis (GW). **Effects of infused glucose, sodium and potassium chlorides and polyphosphates on palatability of hot-boned pork.** *Journal of Animal Science* 68(10): 1990: 3212-3216

Products

Meat

2505

Sen (NP), Baddoo (PA), Seaman (SW) and Weber (D). **2-(Hydroxymethyl)-N-nitrosothiazolidine-4-carboxylic acid in smoked meats and bacon and conversion to 2-(Hydroxymethyl)-N-nitrosothiazolidine during high-heat cooking.** *Journal of Food Science* 56(4): 1991: 913-915

2506

Savage (AWJ), Donnelly (SM), Jolley (PD), Purslow (PP) and Nute (GR). **The influence of varying degrees of adhesion as determined by mechanical tests on the sensory and consumer acceptance of a meat product.** *Meat Science* 28(2): 1990: 141-158

The adhesion between meat pieces in meat products varied by the addition of different concn. of a crude myosin solution, was measured by a trained sensory panel and by two instrumental tests: tensile adhesive strength (TAS) and punch and die. A consumer trial was used to find which level of adhesion was preferred. Results from the sensory panel showed that the adhesion could be detected as highly significant ($P < 0.001$) differences in three tactile measurements and in the two eating qualities, ease of fragmentation and rubberiness. TAS measurements gave larger differences between treatments than punch and die and had very high correlations with ease of fragmentation and crumbliness on cutting. The small consumer study revealed no overall preference for any one product. Hence, although differences in adhesion between meat pieces in a meat product are detectable subjectively and can be measured objectively by TAS tests, preference for any particular strength varies between individuals. AS

Frankfurters

2507

Beilken (SL), Eadie (LM), Jones (PN) and Harris (PV). **Sensory and mechanical assessment of the quality of frankfurters.** *Journal of Texture Studies* 21(4): 1990: 395-409

A sensory profile was established for quantifying the texture and flavour of frankfurter-type sausages. The technique of Free Choice Profiling was used to enable panelists to set up and test their individual sensory profiles using their own list of descriptors or attributes. These profiles were then converted to a consensus or Fixed Choice profile by group discussion and rationalisation. Consensus profile sensory results were compared with results obtained using various compression and punch tests on samples at both room temp. (22 C) and 50 C. Compression test related best to the sensory data and increasing the sample temp. to 50 C. Significantly ($P < 0.001$) improved the objective-sensory relationships. AS

Sausages

2508

Astiasaran (I), Villanueva (R) and Bello (J). **Analysis of proteolysis and protein insolubility during the manufacture of some varieties of dry sausage.** *Meat Science* 28(2): 1990: 111-117

Proteolysis and protein insolubility were studied during the curing of dry sausages such as chorizo, saucisson and salami. Sausages prepared using a meat cutter showed more proteolysis and less protein insolubility in comparison to those prepared using a mincer. Isolubilisation caused a loss in both sarcoplasmic and myofibrillar solubility distinctive for each type of sausage. AS

2509

Bhaduri (S), Smith (PW), Palumbo (SA), Turner-Jones (CO), Smith (JL), Marmer (BS), Buchanan (RL), Zakia (LL), Williams (AC). **Thermal destruction of *Listeria monocytogenes* in liver sausage slurry.** *Food Microbiology* 8(1): 1991; 75-78

Thermal destruction of *Listeria monocytogenes* was determined in a liver sausage slurry (1:1, liver sausage batter and water) using a submerged ampule technique. D-values for *L. monocytogenes* Scott A grown at 37 C were 8.9 min at 57.2 C, 2.4 min at 60.0 C, and 1.1 min at 62.8 C (Z = 6.2 C) based on analysis of the linear portion of the survivor curves. D-values of 6.6, 1.6 and 0.4 min (Z = 4.65 C) were obtained when the data were analyzed using non-linear techniques. *L. monocytogenes* strain V7 (D_{60} = 1.0 min) was more thermosensitive than Scott A (D_{60} = 1.6 min) or HO-VJ-S (D_{60} = 1.6 min). When Scott A was grown at 19 C, there was a decrease in thermal resistance (D_{60} = 0.8 min). These data indicate that *L. monocytogenes* has a thermal resistance in liver sausage comparable to that observed in other food systems. AS

Poultry

2510

Barbut (S) and Mittal (GS). **Influence of the freezing rate on the rheological and gelatin properties of dark poultry meat.** *Poultry Science* 69(5): 1990: 827-832

The gelation and rheological properties of poultry meat frozen at 3 rates (instant by liquid N, fast and slow) and a nonfrozen control were studied. The relationships between the shear rate and shear stress for the different raw-meat batters were found to be nonlinear and followed the Bingham pseudoplastic behaviour. The water-holding capacity (after salt addition) was significantly higher for the frozen treatments compared with the nonfrozen control. A continuous evaluation of the modulus of rigidity (G) during cooking (0.5 per min) revealed different gelation patterns only above 64 C. The fresh meat resulted in the lowest G-value at 72 C, followed by the instant, fast, slow frozen treatments. These differences could be related to the degree of damage to the muscle that resulted from the slower freezing. AS

Chickens

2511

Choe (I-S), Morita (J-I), Yamamoto (K), Samejima (K) and Yasui (T). **Heat-induced gelation of myosins fragments from chicken leg and breast muscles at high ionic strength and low pH.** *Journal of Food Science* 56(4): 1991; 884-890

A study was made to examine whether the mode of filamentogenesis was the only prerequisite for the differences in gel strength of both types of myosins. Results indicated changes in the rigidity of heat-induced gel at 0.6 M KCl and pH 5.4 of leg (L) and breast (B) myosin during digestion. The rigidity of L-myosin digests decreased only slightly during 20 min digestion while that of B-myosin digests was much reduced. The turbidity and solubility of L- and B- mysin mixture, the total protein concn. and other variables were held constant. When L-myosin was present alone the turbidity of the solution was higher than that of B-myosin alone. The heat induced gel of B-myosin had more fine three dimensional network than L-myosin. Gels of L-rod and B-rod showed different network structures but both had larger porosity and more entangled clusters than original myosins. Results also suggest that the mixtures which favoured formation of fine network structures also resulted in stronger gels on heating. SRA

2512

Graf (E) and Panter (SS). **Inhibition of warmed-over flavour development by polyvalent cations.** *Journal of Food Science* 56(4): 1991: 1055-1085, 1067

During cooking and storage of chicken significant quantities of free Fe were released. Apparently Fe bound to negatively charged phospholipids and caused site-specific oxidation that generated warmed-over flavour (WOF) within 24 h of refrigerated storage. Fe sequestration by chelation with phytic acid greatly reduced formation of WOF. Similarly, competitive displacement of Fe and phospholipids with polyvalent cations substantially lowered the rate of WOF formation. In a phospholipid model system, 25 mM Ca^{2+} caused 50% inhibition of malondialdehyde generation. Much lower levels were required to effectively reduce WOF development in precooked poultry. Nitrite completely blocked Fe release from heme-proteins, which explained its inhibitory effect on WOF development. AS

2513

Pikul (J) and Kummerow (FA). **Effects of microwave cooking and refrigerated storage of main broiler parts on lipid oxidation in chicken muscle and skin.** *Poultry Science* 69(5): 1990: 833-844

The absolute amount of lipid oxidation products in chicken muscles and skin after microwave cooking and refrigerated storage was affected by the initial level of those products in the raw samples and by the particular cut of meat. Cooking the different cuts of chicken carcasses by microwave significantly increased the amount of malonaldehyde (MA) and lipid-oxidation fluorescent products (LOFP) in the aqueous phase of Folch-extracted muscles and skin and in the organic phase of Folch-extracted skin lipids. Microwave cooking for the separate broiler parts (especially the drumsticks and wings, as compared to halves or quarters) produced the lowest amount of lipid oxidation products due to the shorter cooking time. Refrigerated storage of broiler parts cooked by microwave produced substantial amounts of MA and LOFP in the aqueous phase of the Folch extracted skin and in the organic phase of the Folch-extracted lipids from the muscles. BV

2514

Dawson (PL), Sheldon (BW), Ball (HRJr) and Larick (DK). **Fatty acid composition of the neutral lipid and phospholipid fractions of mechanically deboned chicken meat.** *Poultry Science* 69(8): 1990: 1414-1419

The fatty acid profiles of the neutral lipid (NL) and seven phospholipid (PL) fractions were determined for raw and cooked mechanically deboned chicken meat using HPLC for separating PL and GC for quantitating fatty acids (FA). The FA concn. for each fraction were reported on a wt. (mg FA/100 g meat) and percentage (% FA of total FA) basis. The FA from the NL fraction constituted 94% of the raw total lipid FA. The FA from the phosphatidylcholine and lysophosphatidylethanolamine (PC-LPE) fraction constituted 38% of the total PL FA. Lysophosphatidylcholine was the most unsaturated (70% unsaturated FA (UFA)] of the PL followed by phosphatidylethanolamine (59% UFA), PC-LPE (58% UFA), phosphatidylinositol (53% UFA), sphingomyelin (47% UFA), and phosphatidylserine (46% UFA). 50% of the NL FA was unsaturated, yet this lipid fraction contained 20 times more unsaturated FA (2.846 mg FA/100 g raw meat) than the combined PL (142 mg FA/100 g raw meat). AS

2515

Ingham (SC), Escude (JM) and McCown (P). **Comparative growth rates of *Listeria monocytogenes* and *Pseudomonas fragi* on cooked chicken loaf stored under air and two modified atmospheres.** *Journal of Food Protection* 53(4): 1990: 289-291

Chicken loaves (25 g) were prepared from manually deboned broiler leg quarters, sterilized and cooled. The loaves were inoculated with approx. log CFU/g 3.0 each of *Listeria monocytogenes* and *Pseudomonas fragi*, stored under air and two modified atm. (MA) at 3, 7, and 11 C. The MA gas mixes contained 50% CO_2 and 10% O_2 (MA1) and 80% CO_2 and no O_2 (MA2), balance proprietary. *L. monocytogenes* and *P. fragi* grew under air at all 3 temp., with growth of *P. fragi* being more rapid. The MA1 reduced growth of both sp. at all 3 temp. However, *L. monocytogenes* growth was less severely affected and exceeded growth of *P. fragi* at 7 and 11 C. The MA2 inhibited growth of both sp. with *P. fragi* growth being inhibited more than growth of *L. monocytogenes* at 3, 7 and 11 C. *L. monocytogenes* grew somewhat faster under MA1 than under MA2. Neither MA1 nor MA2 appeared to be effective at inhibiting growth of *L. monocytogenes* on cooked poultry loaf. AS

2516

Jantawat (P) and Carpenter (JA). **Salt preblending and incorporation of mechanically deboned chicken meat in smoked sausage.** *Journal of Food Quality* 12(5): 1989: 393-401

2517

Jantawat (P) and Carpenter (JA). **Phosphate and non-meat protein incorporation into smoked sausage produced from mechanically deboned poultry meat.** *Journal of Food Quality* 12(5): 1989: 403-410

2518

Kettlewell (PJ) and Hallworth (RH). **Electrical stunning of chickens.** *Journal of Agricultural Engineering Research* 47(3): 1990: 139-151

A review of various aspects of electrical stunning of poultry (broilers) with special reference to electric water bath stunner is presented. The welfare of the birds prior to slaughter (factors causing stress to the birds prior slaughter, electrical stunning and electrical killing) are discussed. Factors concerning the quality of stunning, the effects on bleed out and the carcass quality are reviewed. The performance of electrical water bath stunner is discussed. Modification for improvement of the operation of the stunner is also discussed. 47 references. BV

Broilers

2519

Su (Y), Ang (CYW) and Lillard (DA). **Precooking method affects warmed-over flavour of broiler breast patties.** *Journal of Food Science* 56(4): 1991: 881-883, 898

Broiler breast patties cooked in a water bath (85 vs 95 C) or oven (160 vs 180 C) to an internal temp. of 83 C were stored at 3 C for 3 days, reheated, and evaluated by headspace GC and thiobarbituric acid (TBA) methods. Cooking temp. within the same cooking medium had no effect on TBA values or headspace GC profiles of cooked, stored samples. During post-cooking storage TBA values and several headspace volatiles increased. The changes were more severe in oven-cooked than water-cooked patties, which could have been partly due to lower moisture content of the oven-cooked patties. Significant correlations were found between TBA values and several major headspace volatiles (pentanal, hexanal, heptanal, and total volatiles). AS

2520

Lyon (CE) and Lyon (BG). **The relationship of objective shear values and sensory tests to changes in tenderness of broiler breast meat.** *Poultry Science* 69(8): 1990: 1420-1427

A 24-member untrained panel evaluated the samples of broilers breast meat for juiciness, tenderness, and overall texture acceptability. The samples were evaluated objectively using the Warner-Bratzler (W-B) and Allo-Kramer (A-K) shear devices. Objective shear values and sensory scores were significantly affected by post-mortem deboning times and cooking method. The data indicated that W-B values in the range of 6.5 - 3.5 kg and A-K values in the range of 8.8 - 6.0 kg/g would correspond to the "slightly tender" to "moderately tender" portion of the sensory scale. BV

Goose

2521

Blum (JC), Labie (C) and Raynaud (P). **Influence of weight and chemical components of goose fatty liver on fat and jelly cook-out after heat treatment at 104 C.** *Sciences Des Aliments* 10(3): 1990: 543-554 (Fr)

Eggs

2522

Foegeding (PM) and Leasor (SB). **Heat resistance and growth of *Listeria monocytogenes* in liquid whole egg.** *Journal of Food Protection* 53(1): 1990: 9-14

Listeria monocytogenes F5069, ATCC 19111, Scott A, and two *L. monocytogenes* strains isolated from egg were evaluated for growth and thermal resistance in liquid whole egg. Each strain grew in liquid whole egg at temp. between 4 and 30 C, except Scott A which did not grow at 4 or 10 C. Generation times ranged from 24 h for F5069 to 51 h for ATCC 19111 at 4 C and from 7.8 h for one of the egg isolates to 31 h for ATCC 19111 at 10 C. Max. populations for each strain increased with increasing growth temp. and were between 10^5 and 3×10^8 CFU/g. Decimal reduction times (D-values) of each *L. monocytogenes* strain in raw liquid whole egg were similar to D-values reported in milk. The heat resistance of all strains was similar. For *L. monocytogenes* F5069, D-values ranged from 22.6 min at 51 C to 0.20 min at 66 C. The Z $_D$-value for F5069 was 7.2 C. Minimal pasteurization parameters (60 C, 3.5 min) for liquid whole egg would result in 99 to 99.9% inactivation (populations reduced 2 to 3 log cycles) of the *L. monocytogenes* strains tested. AS

2523

Foegeding (PM) and Stanely (NW). ***Listeria monocytogenes* F5069 thermal death times in liquid whole egg.** *Journal of Food Protection* 53(1): 1990: 6-8

Thermal death times (F-values) for *L. monocytogenes* F5069 inoculated into sterile liquid whole egg were determined between 62 and 73 C by a submerged capillary tube procedure. The initial population was 5×10^6 to 2×10^7 CFU/tube (0.05 ml). High populations intentionally were selected to build in a safety factor. At each temp., F-values were determined to be the shortest heating time which did not permit recovery of *L. monocytogenes* from 6 or more replicate tubes. *L. monocytogenes* were recovered by incubating the entire contents of the capillary tube in brain heat infusion broth at 25 C for 2 wks. At 62 C, F = 16 min.and at 69 C, F = 1.6 min. The Z $_F$-value was 7.1 C. Minimal pasteurization of egg would not result in product free from *L. monocytogenes* if initial populations were large. Ultrapasteurization processes may be designed to produce product free from *L. monocytogenes* and appropriate for prolonged refrigeration. AS

SEAFOODS

Carp

2524

Hatae (K), Sakamoto (H), Shimada (A), Matsumoto (M), Yamanaka (H), Watabe (S). **Physical properties of "arai" made by applying of thaw-rigor.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(11): 1990: 2113-2118 (Ja)

Slices of carp muscle were frozen at -20 C and were made into "arai" by thawing method in 4 different ways, that is, they were (1) left at 4 C for 60 min followed by washing in 18 C water for 3 min, (2) left at 20 C for 30 min, (3) washed in 18 C water for 3 min, and (4) washed in 49 C wafer for 20 s. The physical property of these "arai" was determined by cluster analysis and principle component analysis of 7 items of measurement. The physical property of sample (1) changed a little and resembled that of a raw sample. Samples of the (2), (3) and (4) resembled each other in physical property and their properties were almost the same as that of "arai" made by the traditional method reported previously. Only minute amounts of ATP remained in all of the samples after thawing. Although the sample (1) was not judged suitable for the preparation of an "arai" dish, samples (2), (3) and (4) were judged to be satisfactory, and there was no difference among the three samples. AS

Oysters

2525

Jeong (BY), Ohshima (T), Koizumi (C) and Kanou (Y). **Lipid deterioration and its inhibition of Japanese oyster *Crassostrea gigas* during frozen storage.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(12): 1990: 2083-2091

Lipid deterioration and its inhibition in the Japanese oyster *Crassostrea gigas* during frozen storage were investigated. The shelled oyster were treated with antioxidants such as dibutylhydroxytoluene and natural vitamin E, and then stored at -20 C for 12 months and the effect of deoxygenizer was examined similarly. Untreated oyster were also stored either at -20 C or at -35 C. During storage, changes in TBA value, POV, and fatty acid and class comp. of lipids were determined to evaluate the quality of oyster. The colour and taste of cooked oysters were also evaluated. POV in all the samples increased gradually with the duration of storage. Contents of phosphatidylcholine (PC) and triglyceride decreased in varied degrees, while those of free fatty acid, lyso-PC (LPC) increased. These changes in lipid classes proceeded at higher rate in the samples stored at -20 C than in the sample stored at -35 C. Percentages of polyenoic acids in lipids decreased in all the samples during storage, whereas those of saturated and monoenoic acids increased. Decreasing rates in the percentages of polyenoic acids were highest in the untreated sample (-20 C) and lowest in the sample with enclosed deoxygenizer. Sensory scores of the untreated sample (-35 C) and the sample with enclosed deoxygenizer almost did not decrease during storage over 12 months. These results clearly indicated that the lipid deteriorations of oyster were inhibited effectively by storing at -35 C as well as by storing with enclosed deoxygenizer at -20 C. AS

Prawns

2526

Slattery (SL) and Williams (DJ). **Sulphite residues in prawns stored in metabisulphite-treated refrigerated sea water.** *Food Australia* 43(1): 1991: 25-27

Prawns stored in refrigerated sea water (RSW) with added sulphite at a concn. of 350 mg/L sulphur dioxide gave good protection from black spot development during subsequent ice storage. Sulphur dioxide residues in prawn flesh were below the 30 mg/kg max. allowed in the Australian domestic product. Delay in the addition of sulphite to RSW may result in prawns having excessive residue levels due to an increased uptake of sulphite. BV

Snails

2527

Imevbore (EA). **Fatty acid and cholesterol contents of three species of the African gaint land snails.** *Die Nahrung* 34(9): 1990: 869-870

Fish

2528

Vidya Sagar Reddy (G) and Srikar (LN). **Preprocessing ice storage effects on functional properties of fish mince protein.** *Journal of Food Science* 56(4): 1991: 965-968

The postmortem holding of pink perch (*Nemipterus japonicus*) in ice before deboning and mincing resulted in significant differences in protein solubility (PS), emulsifying capacity (EC), water binding capacity (WBC) cooking loss, drip loss and texture scores. On correlating mean panel scores for texture with storage, fresh product was in acceptable condition for 145 days. Fish held in ice for 3, 5, 11 and 14 days were rated acceptable in quality upto 123, 105, 86 and 28 days, resp. SRA

2529

Armstrong (SG), Leach (DN) and Wyllie (SG). **Nutritional evaluation of lipids in fish from temperate Australian waters.** *Journal of Food Science* 56(4): 1991: 1111-1112

2530

Ishikawa (M), Kato (M), Mihori (T), Watanabe (H) and Sakai (Y). **Effect of vapour pressure on the rate of softening of fish bone by super-heated steam cooking.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(10): 1990: 1687-1691

The softening process of fish bone was studied to utilize fish bone as a Ca source in human diet. To reduce the loss of soluble components of fish tissue during cooking, heating by super-heated steam was examined. Since drying of fish tissue might occur during super-heated steam cooking, the softening rate of mackerel spine and the moisture loss of mackerel meat cooked in super-heated steam were determined for samples cooked at 120 and 130 C under pressures in the range from 1.2 kgf.cm $^{-2}$ to 2.7 kgf.cm $^{-2}$ (absolute pressure). The softening reaction conformed to an apparent first-order reaction. The softening rate constant apparently depended on the pressure of the super-heated steam and not on the temp. of the steam. It is interpreted from the results that the temp. of the spine was the saturation temp. of the super-heated steam which depends only on the total pressure and is independent of the temp. of the super-heated steam. The softening rate constant was represented by an Arrhenius type equation as following: $\log(k) = 12.2 - 5.96 \times 10^{3}(1/T_s)$. k: the softening rate constant (s $^{-1}$), T_s: the saturation temp. of the super-heated steam. The loss of moisture during cooking was small (2.5 - 7.9%). AS

2531

Okazaki (E), Katayama (S) and Shibata (N). **Provitamin D_3 contents in fish meat.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(10): 1990: 1695

2532

Murata (M) and Sakaguchi (M). **Influence of the ethanol treatment on pHs of boiled meat extracts of fish, shellfish and domestic animals.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(10): 1990: 1697

2533

Venugopal (V). **Extracellular proteases of contaminant bacteria in fish spoilage: A review.** *Journal of Food Protection* 53(4): 1990: 341-350

This article attempts to focus the proteolytic activities of contaminant microorganisms in fish, the role of muscle constitutents on protease synthesis, involvement of extracellular proteases in bacterial penetration of the muscle, and action of the enzymes on fish muscle proteins. The limitation of conventional chilling in completely controlling the bacterial spoilage has been stressed since the proteases secreted by psychrotrophic organisms can act on the fish muscle even at low temp. This article advocates employment of stringent measures to control secretion and activities of bacterial extracellular proteases to prolong the keeping qualities of refrigerated fish. BV

Catfish

2534

Erickson (MC). **Extraction and quantitation of tocopherol in raw and cooked channel catfish.** *Journal of Food Science* 56(4): 1991: 1113-1114

Cod

2535

Boismenu (D), Lepine (F), Thibault (C), Gagnon (M), Charbonneau (R), Dugas (H). **Estimation of bacterial quality of cod fillets with the disc flotation method.** *Journal of Food Science* 56(4): 1991: 958-961

Spoilage bacteria of cod fillets were desorbed off the fillet surface by ultrasonication. Catalase activity of these bacteria was determined using the disc flotation method after selective heat inactivation of the endogenous cod catalase and then correlated with the colony forming units. The method was applied to cod fillets from ten retail sources with satisfactory results. AS

2536

Botta (JR). **Instrument for nondestructive texture measurement of raw Atlantic cod (*Gadus morhua*) fillets.** *Journal of Food Science* 56(4): 1991: 962-964, 968

A portable instrument was developed to rapidly and objectively determine texture (firmness and resilience) of raw Atlantic cod (*Gadus morhua*) fillets. A controlled study determined the texture of raw fillets from 774 cod, caught at three different times of yr. Compared to texture grades of fillets assessed by trained and experienced Fish Inspection Officers, this instrument was a dependable method of rapidly determined texture of raw fillets. AS

Marlin

2537

Lo (J-R), Mochizuki (Y), Nagashima (Y), Tanaka (M), Iso (N), Taguchi (T). **Thermal transitions of myosins fragments from black marlin (*Makaira mazara*) ordinary and dark muscles.** *Journal of Food Science* 56(4): 1991: 954-957

Thermal transitions were studied by means of differential scanning calorimetry (DSC) and a spectrophotometric method. Three endothermic peaks (40, 43, 50 C: ordinary muscle; 46, 54, 62 C: dark muscle) were observed in DSC thermograms of both myosins. Thermograms of S-1 fragments showed one peak (41 C: ordinary muscle, 43 C: dark muscle). But ordinary and dark muscle rod fragments gave two peaks (41, 62 C) and one peak (58 C), resp. The spectrophotometric results also showed two thermal transitions for both myosins and one transition for their S-1 fragments. However, the rod from ordinary muscle myosin had two transitions, whereas that from dark muscle myosin had one transition. AS

Pollack

2538

Pensabene (JW), Fiddler (W), Gates (RA), Hale (M), Jahncke (M), Gooch (J). **N-Nitrosothiazolidine and its 4-carboxylic acid in frankfurters containing Alaska Pollock.** *Journal of Food Science* 56(4): 1991: 1108-1110

2539

Shoji (T), Saeki (H), Wakameda (A), Nakamura (M) and Nonaka (M). **Gelation of salted paste of Alaska pollack by high hydrostatic pressure and change in myofibrillar protein in it.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(12): 1991: 2069-2076

Frozen surimi of Alaska pollack was ground with 2.5% NaCl and treated by a high hydrostatic pressure. Strong gel was formed from the salted paste by treatment at 2.0 - 4.0 kbar at 0 C for 10 min. The gel by 3.0 kbar pressure treatment had the greatest gel strength. The high pressure-induced gel was different from the heat-induced gel in its property. It had greater gel strength and is more transparent in the appearance compared with the heat-induced gel. The high pressure-induced gel had a small amount of myosin heavy chain and concomitantly a large amount of high mol. wt. components. Furthermore, it also had a large amount of C1 component which was not solubilized with SDS-urea-mercaptoethanol medium, whereas the heat-induced gel had no such component. These findings suggest that gel-formation by a high pressure depend largely on the cross-linking of myosin heavy chain. These results indicated that gelation of meat paste induced by a high pressure may be advantageous to processing of a new type fabricated food from fish meat. AS

Sardines

2540

Nonaka (M), Hirata (F), Saeki (H), Nakagawa (K), Ooizumi (T), Kawasaki (K). **Effect of freshness of sardine on the quality of highly nutritional fish meat for foodstuff.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(10): 1990: 1667-1672 (Ja)

A foodstuff tentatively named highly nutritional fish meat for foodstuff (HNFM) was prepared from round sardine stored for 5 days at 2 C by the method previously described, and the changes in several properties were investigated. The quantity of volatile compounds (VC) arisen from the minced meat increased during the storage of the round sardine, but that from HNFM hardly changes. HNFM prepared from the stored sardine gave off little undesirable odour. The gel-forming ability and myofibrillar Ca-ATPase activity of HNFM rapidly decreased during the storage of the round fish even at a low temp. as raw material. On the contrary, Ca-ATPase activity of dewatered-ground meat was kept at a high level during the storage, and the deterioration of gel forming ability was remarkably supressed. For the purpose of manufacturing the HNFM of high quality, it is essentially important to prepare it from the fresh fish as rapidly as possible and to freeze it with the addition of cryprotectants. AS

2541

Nonaka (M), Hirata (F), Saeki (H), Sasaki (I) and Matukawa (M). **An attempt to improve the quality of highly nutritional fish meat for foodstuff from sardine by introducing underwater mincing of raw material.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(11): 1990: 1871-1876

By introducing underwater mincing of fresh raw material, the quality of the foodstuff tentatively named highly nutritional fish meat for foodstuff (HNFM) was appreciably improved. The quality of HNFM thus obtained was examined by total activity of myofibrillar Ca-ATPase and gel forming ability of it. The quality of HNFM prepared from the minced meat in suspension (pH 7.0) as the intermediate raw material hardly changed, while such raw material was stored 2 C for 28 h. However, that of HNFM prepared directly from the meat of sardine lowered rapidly during the sardine as the raw material stored at the same condition. The first order rate constant

of dematuration rate of myofibrillar Ca-ATPase indicated that myofibrillar protein in the minced meat in suspension was 10 time more stable than that in the muscle tissue of round fish. Deteriorations of gel forming ability of both HNFM from the minced meat in suspension and round fish muscle wer paralled with the denaturation of myofibrillar Ca-ATPase activity of them. AS

Trout

2542

No (HK) and Storebakken (T). **Colour stability of rainbow trout fillets during frozen storage.** *Journal of Food Science* 56(4): 1991: 969-972, 984

Vacuum-packed fillets of rainbow trout maintained in different water salinities and temp. (-20 and -80 C) and fed diets supplemented with synthetic astaxanthin or canthaxanthin were studied for stability of carotenoids and colour. Carotenoids in the flesh were stable (upto 5% loss) for 6 months at -20 or -80 C, regardless of carotenoid sources and rearing conditions. Frozen storage resulted in increased lightness, redness and yellowness, and decreased hue values. Colour characteristics from different parts of the fillet differed significantly. SRA

2543

Montero (P) and Borderias (J). **Behaviour of myofibrillar proteins and collagen of trout muscle (*Salmo irideus* Gibb.) during frozen storage and their implication on texture.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 377-386 (Es)

Modifications of myofibrillar protein and collagen of trout muscle during storage (-12 C) have been studied with whole, mince and wash-mince muscle. Washing muscle produced more actomyosin and collagen aggregation during frozen storage. No great changes were observed in protein solubility during frozen storage and therefore no high texture changes were detected neither in raw nor in cooked trout although both changes, were correlated. AS

2544

Gutemann (WH) and Lisk (DJ). **Higher average mercury concentration in fish fillets after skinning and fat removal.** *Journal of Food Safety* 11(2): 1991: 99-103

Skinning resulted in an increase in the av. concn. of total mercury in the fillets of fish *Salmo trutta* L.) of either sex but the increase were not significant. The fillets of the male fish appeared to be higher in mercury than that in the corresponding fillets of female fish. KMA

Yellowtail

2545

Oka (H), Ohno (K) and Ninomiya (J). **Changes in texture during cold storage of cultured yellowtail meat prepared by different killing methods.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(10): 1990: 1673-1678 (Ja)

Cultured yellowtails were killed by the following 3 different methods: (1) stabbing the spinal bulb, (2) dipping in cold sea water and (3) letting them die in the air. Immediately after death, the fish were stored at 5 C. Rigor index, ATP and its relative compounds, and hardness of the fish meat were measured at constant time interval to examine the relationship between the rigor phenomenon in the round fish and the hardness of the fish killed by the (1), (2) and (3) methods resp. No correlation was observed between the external hardness of the round fish and the hardness of the dorsal meat. The hardness of meat showed the highest value just after death and did not increase during storage. As the stabbed fish maintained the hardness of meat longest after death, this method was found to be the most effective to offer high textural quality sashimi. AS

Products

2546

Matsunaga (A), Ooizumi (T), Yamamoto (A), Kawasaki (K) and Mizukami (E). **Degradation of polyphosphates during manufacturing process of surimi-based products.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(12): 1990: 2077-2082

A method of HPLC using post column reaction system has been established by us for the detn. of polyphosphates (PP) in foods and PP contents in commercially available surimi-based products have also been examined. In the present investigation, behaviour of PP during the manufacturing process of surimi-based products was studied. Surimi was made from Alaska pollack muscle washed twice with a buffer solution (pH 7.5). Aliquots of salted meat paste, which was a mixture of surimi, NaCl and tripolyphosphate (P3), were incubated under various conditions. After incubation, aliquots were homogenized with ice-cold 6% trichloroacetic acid and centrifuged. The supernatants obtained were applied to HPLC for the detn. of PP. It was found that P3 was enzymatically degraded to pyrophosphate (P2) and orthophosphate (P1) in the salted meat paste during grinding and setting processes, but P2 was seldom degraded to P1. Optimal temp., NaCl concn., and pH of

tripolyphosphatase (P3ase) activity in the salted meat paste were around 27 C, 6%, and 6.0, resp. P3ase was rapidly heat-inactivated at temp. above 35 C. Although thermal degradation of P3 occurred during heating process, the degree of degradation was much smaller than that by P3ase during grinding and setting processes. AS

Fish

2547
Saito (H) and Nakamura (K). **Antioxidative effect of sesamol on fish oil oxidation.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(11): 1990: 1893

Oxidation of fat in marine products can be effectively retarded by adding or coating sesame oil to fish oils and dried products. BV

2548
Yan (X), Barlow (PJ) and Craven (C). **Discrimination in recovery during capillary GLC analysis of fish oil: The use of a recovery correction factor (RCF).** *Food Chemistry* 40(1): 1991: 93-99

A recently proposed capillary GLC method for EPA and DHA detn. in fish oils was examined. It was found that whilst the area percentage of each fatty acid showed good reproducibility when an internal standard was used, the mg/g values varied considerably. A linear relationship was observed between mg/g values of EPA and DHA and their relative recovery to C23:0, a commonly used internal standard. Following hydrogenation of the samples it became apparent that losses were likely due to the high susceptibility of polyunsaturates to oxidation. A recovery correction factor was therefore proposed to be incorporated into the calculation of analysis. This may lead to a more accurate estimation of these PUFAs. AS

PROTEIN FOODS

Infant foods

2549
Grun (IU), Barbeau (WE), Chrisley (BM) and Driskell (JA). **Determination of vitamin B $_6$, available lysine, and E-pyridoxyllysine in a new instant baby food product.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 102-108

Selected jar and instant baby foods processed in 1985 and 1987 were analyzed for their vitamin B $_6$, available lysine, and E-pyridoxyllysine content in summer 1988. Jar and instant vegetable and beef were found to be higher in available lysine content but lower in vitamin B $_6$ than banana products. Instant products were found to be higher in vitamin B $_6$ than jar products. On a wet wt. basis the instant products also contained higher amounts of available lysine than jar products. However, after adjustment for protein content, jar products were higher in available lysine than instant products. Baby foods processed in 1985 tended to be lower in vitamin B $_6$ and available lysine content than products processed in 1987. Pyridoxyllysine was below detectable quantities in all of the baby foods analyzed in this study. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

2550
Hernandez (E) and Baker (RA). **Turbidity of beverages with citrus oil clouding agent.** *Journal of Food Science* 56(4): 1991: 1024-1026

Basic principles of light scattering were used to predict turbidity in cloudy beverages for monodisperse and polydisperse systems of suspended citrus oil globules. Study also showed the use of the light scattering principles could be used to predict effects of light wavelength, refractive index of continuous and dispersed media, and size distribution standard deviation on scattering efficiency coeff. Predicted values for specific turbidity agreed with experimental values for diluted citrus oil-in-water beverage cloud emulsions (prepared with a pressure homogenizer at different pressures of 4.1 - 27.56 kPa). Size distributions obtained for the emulsions fit the the long-normal distribution and the distribution curves became more narrow as pressure of homogenization increased. SRA

Alcoholic beverages

Beer

2551
Peris (M), Muller (D) and Maquieira (A). **Determination of total polyphenols in beers by flow injection analysis.** *Food Chemistry* 40(1): 1991: 1-8

Two automatic flow injection methods for the detn. of total polyphenols in beers on classical reactions (the Folin-Ciocalteu reagent method and the International Official method) are proposed. Their usefulness was tested by applying them to different beers. The results obtained agree with those provided by the corresponding batch methods. AS

2552

Matsuzawa (K) and nagashima (Y). **A new hydrated silica gel for stabilization of beer.** *Technical Quarterly, Master Brewers Association of America* 27(3): 1990: 66-72

A new type of hydrated silica gel for stabilization of beer which is different from other existing gels has been developed. The porous three-dimensional network structure of this silica gel is as stable as dry gel, and the large internal pore volume, specific surface area, mean pore diameter and active silanol groups on the surface are retained in suitable condition through the special dehydration technique. Because of this unique structure and physical properties, this silica gel shows high chillproffing performance. The advantages of this silica gel are: dosage can be greatly reduced (30 - 50%) compared to other silica gels; as this silica gel adsorbs protein very quickly, treatment of beer can be completed within only a few minutes; dispersibility in beer is superior to other silica gels and purity of this silica gel is so high (99% SiO_2) that leakage of undesired soluble substance from silica gel onto beer can be avoided. AS

2553

Scheer (FM). **Effects of high protein malts on finished beers.** *Technical Quarterly, Master Brewers Association of America* 27(3): 1990: 73-75

A detailed look at malt analysis shows that the malt used did indeed fit the intended profile. High protein malts results in high wort protein, FAN and formal N and also in more fermenting by-products, such as diacetyl. Foam testing results show that the high protein malts made beer with better foam quality. This paper shows the micro-brewer point of view, the problems the micro-brewer is confronted with by using malts with high protein malts. AS

Brewing

2554

Boulton (CA). **Applications of yeast physiology for improvements in the brewing process.** *Journal of Chemical Technology and Biotechnology* 50(1): 1991: 135-137

Wines

2555

Puchades (R), Lemieux (L) and Simard (RE). **Chemiluminescent assay for glycerol in wine using flow-injection.** *Journal of Food Science* 56(4): 1991: 1097-1100

2556

Chatonnet (P), Boidron (JN) and Pons (M). **Maturation of red wines in oak barrels: Evolution of some volatile compounds and their aromatic impact.** *Sciences Des Aliments* 10(3): 1990: 565-587

2557

Ueda (S), Ueki (T), Ohba (R), Teramoto (Y) and Yoshizawa (K). **Ethanol fermentation of aromatic red rice without cooking. Studies on red wine brewing (Part 1).** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 70(5): 1990: 326-328

Using aromatic red rice (*Oryzae sativa* var. *Indica, Tapol*), which contained anthocyanin pigments, as a raw material, fermentation without cooking was done at pH 3.5 and 30 C to produce a novel type of alcoholic beverage designated as aromatic red rice wine. The final ethanol concn. achieved during fermentation was 9.3% by vol. Aromatic red rice wine was rich in a fruity aroma and had a characteristic sour taste by GC analysis and organoleptic test. Fermentation without cooking was effective for conservation of the red pigment and aroma components of aromatic red rice. The uncooked ethanol fermentation of aromatic red rice in this work has been proved by experiment to be suitable for economical production of a novel type of rose-wine-like alcoholic beverage. AS

2558

Nakanishi (K), Wu (W) and Yokotsuka (K). **Purification and some properties of thermostable invertase from wine.** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 71(1): 1991: 66-68

Invertase from a white table wine made from Semillon grapes waspurified to homogenity on polyacrylamide gel electrophoresis. The enzymatic and physiochemical properties of the enzyme were compared with those of invertase purified from Semillon grape juice. The invertases from the two sources showed similar properties, suggesting that the wine invertase originated from the juice and was stable during the vinification and aging processes. AS

Non-alcoholic beverages

Coffee

2559

Clifford (MN). **Phenols and caffeine in wet-processed coffee beans and coffee pulp.** *Food Chemistry* 40(1): 1991: 35-42

The contents of low mol. mass phenols and caffeine have been analysed in 5 samples of beans and the associated pulp, derived from 2 sp. of coffee and 2 associated hybrids. The comp. of the coffee beans was consistent with previous reports. The pulp contained smaller quantities of the same caffeoylquinic acids, feruloylquinic acids and dicaffeolyquinic acids as the beans, but caffeoylferuloylquinic acids were not found even in the pulp from a robusta coffee. Pulp from a robusta coffee had a lower caffeine content than the pulp from two arabica cvs, the reverse of the situation existing in the beans. A significant component in all pulp samples was isolated and identified as protocatechuic acid. AS

Caffeine

2560
Shi (X), Dalal (NS) and Jain (AC). **Antioxidant behaviour of caffeine: Efficient scavenging of hydroxyl radicals.** *Food and Chemical Toxicology* 29(1): 1991: 1-6

This study reports on the reaction of 1,3,7-trimethylxanthine (caffeine) with the hydroxyl radical (-OH), as investigated by electron spin resonance (ESR) spin trapping. The -OH was generated by the Fenton reaction ($Fe^{2+} + H_2O_2$) as well as by the reaction of chromium(V) with H_2O_2. The results show that caffeine effectively scavenges -OH with a reaction rate constant of -5.9×10^9 $M^{-1}s^{-1}$ that is comparable with those of other efficient -OH radical scavengers. ESR measurements provide evidence that a caffeine-derived oxygen-centred radical is formed in the reaction of caffeine with -OH and suggest a biochemical basis for the understanding of the reported anticarcinogenic properties of caffeine and related methylxanthin compounds. AS

Fruit juices

2561
Chandler (BV). **Fruit juice review 6.** *Food Australia* 43(1): 1991: 16-18

This review covers raw materials, juice processing - citrus juice processing, packaging and storage, chemical analysis and components, adultration control and industrial aspects. SRA

Apple juices

2562
Babsky (NE), Wrolstad (RE) and Durst (RW). **Influence of commercial shipping on the colour and composition of apple juice concentrate.** *Journal of Food Quality* 12(5): 1989: 355-367

Citrus juices

2563
Braddock (RJ), Sadler (GD) and Chen (CS). **Reverse osmosis concentration of aqueous-phase citrus juice essence.** *Journal of Food Science* 56(4): 1991: 1027-1029

This study defines some parameters affecting reverse osmosis (RO) concn. of two of the smallest molecules, ethanol and acetaldehyde, as well as other aroma compounds in citrus essence. RO concn. of acetaldehyde and ethanol in orange juice essence was noticeably more efficient at lower alcohol concn. For other aroma compounds, rejection was greater than 90%, upto 30% alcohol essence. Permeat flux rates exhibited first-order decay with respect to ethanol concn. Since some commercial citrus essence products have very high alcohol contents (65% ethanol), the max. 31% alcohol concn. achieved in this study would limit application to the point of recovery at the citrus processing plant. SRA

Orange juices

2564
Arreola (AG), Balaban (MO), Marshall (MR), Peplow (AJ), Wei (CI), Cornell (JA). **Supercritical carbon dioxide effects on some quality attributes of single strength orange juice.** *Journal of Food Science* 56(4): 1991: 1030-1033

The effect of supercritical carbon dioxide (SC CO_2) treatment on pH, cloud stability, °Brix, total acidity, colour, ascorbic acid content, flavour, aroma and general appearance of single strength orange juice (SSOJ) was studied with treatment pressures (7 - 34 MPa), temp. (35 - 60 C) and time (15 - 180 min). SC treatment of OJ temporarily reduced pH of the juice, and inactivated pectinesterase (PE). After depressurization, pH was restored to the original value and did not change brix value; more ascorbic acid was retained, enhanced cloud, but decreased acidity. Sensory quality was not affected. The method offers many potential processing benefits for OJ and other juices. SRA

Soft drinks

2565

Prakash (A), Joseph (M) and Mangino (ME). **The effects of added proteins on the functionality of gum arabic in soft drink emulsion systems.** *Food Hydrocolloids* 4(3): 1990: 177-184

The addition of small amounts of whey proteins increased the functionality of gum arabic in model soft drink emulsions. The poorer the functionality of the gum arabic, the greater the omprovement in emulsion activity index caused by the addition of whey protein conc. Addition of excess whey protein conc. caused a decrese in emulsion activity index. The ash content and gel strength of the whey protein conc. were related to their ability to increase the emulsion activity index of gum arabic stabilized emulsions. Heating of the milk from which the whey protein conc. were derived caused a further increase in emulsion activity index up to 72 C. Heating beyond this temp. had a negative effect on emulsion activity. Thus, the functionality of inferior types of gum arabic for use in liquid emulsions may be improved by the addition of small amounts of whey protein conc. selected for this purpose. AS

FATS AND OILS

2566

Thippeswamy (HT) and Raina (PL). **Lipids of kokum (*Garcinia indica*) and dhupa (*Veteria indica*). Part II.** *Journal of Food Science and Technology (India)* 28(4): 1991: 195-199

The total lipids of kokum and dhupa contained a major proportion of neutral lipids (88.00 and 75.80%) comprising predominantly of triglycerides (84.9 to 68.7%). The glycolipids 4.0% of kokum were digalactosyl diglyceride (30.9%) and monogalactosyl diglyceride (19.3%) whereas, the major glycolipids (23.1%) of dhupa were sterolglycoside (23.5%) and acylsterolglycoside (15.6%). The phospholipid contents were identical in both kokum and dhupa, having phosphotidyl ethanolamine (75.4 and 48.5%) as a major constituent. All the lipid fractions showed palmitic and stearic acids as major fatty acids. BV

2567

Prajapati (PS), Gupta (SK), Patel (AA) and Patil (GR). **Ingredient selection for production of a low-fat butter flavoured spread.** *Journal of Food Science and Technology (India)* 28(4): 1991: 204-207

A 50:50 blend of hydrogenated fat and soybean oil was better in terms of rheological and sensory characteristics of the spread. Addition of carrageenan (0.1%) and tri-sodium citrate (1.0%) enhanced water binding, whereas glycerol mono-stearate (0.3%) improved the emulsion characteristics. Reconstituted skim-milk powder formed the source of protein. AS

2568

Prajapati (PS), Gupta (SK), Patel (AA) and Patil (GR). **Processing of low-fat butter flavoured spread.** *Journal of Food Science and Technology (India)* 28(4): 1991: 208-211

In the process of standardizing the method of manufacture of a low-fat spread similar to table butter, cooling of fat phase, vital to successful emulsification, was investigated. Rapid cooling to 30 C followed by slow cooling to 5 C prior to warming to the emulsification temp. yielded a product with the most desirable texture. Addition of 15 p.p.m. diacetyl and 1.5% salt to the spread acidulated to pH 5.8 was made it flavour-wise most acceptable as a butter-like product. While the spread was akin to butter with respect to flavour, appearance, body and texture, it had a distinctly superior spreadability as judged sensorily and in rheological properties. AS

Fats

2569

Engst (W), Elsner (A), Schliemann (H) and Mieth (G). **On the synthesis and characterization of sucrose fatty acid polyesters. Part 4. Testing of sucroacetoglycerides in food like test systems.** *Die Nahrung* 34(9): 1990: 857-867 (De)

The influence of sucroacetoglycerides (SAG) as new surface active compounds is investigated in food like systems. The results prove excellent behaviour regarding emulsification and stabilization. Some of these products show also positive effects on spattering loss of margarine, viscosity of chocolate and quality of bakery products. The characteristics of SAG are determined by the synthesis conditions. AS

Butters

2570

Cepeda (A), Vazquez (ML), Sargi (L), Prognon (P), Mahuzier (G), Bisagni (E). **Determination of biacetyl in fats by liquid chromatography coupled with sensitized room-temperature phosphorescence.** *Sciences Des Aliments* 10(3): 1990: 555-563

A new liquid chromatographic method of detn. of biacetyl in fats (butters and margarines) coupled with an original procedure of room-temp. sensitized detection (RTP) is proposed.

4',5'-dihydro-3-carbethoxy psoralen (H_2 3CPS) was used to promote triplet-triplet energy transfer to biacetyl. After sensitization biacetyl emits an intense phosphorescence signal at 516 nm. This system is used in liquid chromatography for its exceptional specificity ensured by an E_T difference of 4 kcal/mole between the triplet states of H_2 3CPS and biacetyl. Chromatographic elution was performed with a cyclodextrin cross-linked column flushed with an apolar eluent consisting of a hexane/methanol mixture (9/1, v/v) spiked with 10^{-4}MH $_2$3CPS. This apolar medium was chosen because of its ability to solubilize both fats and H_2 3CPS and because it enhances the phosphoresence signal of biacetyl. Under these conditions, the detection limit for biacetyl was 5 p.p.b. for signal-to-noise ratio of two. The RSD was 1.09% at 50 p.p.b. and linearity was verified from 10 p.p.b. to 5 p.p.m. (r = 0.999). No interference with detn. was noted when the proposed method was applied to commercial samples of fats. AS

Oils

2571

Yoshida (H), Hirooka (N) and Kajimoto (G). **Microwave heating effects on relative stabilities of tocopherols in oils.** *Journal of Food Science* 56(4): 1991: 1042-1046

2572

Finchum (EL). **Tropical/domestic oils, R and D considerations.** *Manufacturing Confectioner* 69(11): 1989: 71-80

This paper focuses on the chemical and physical properties of tropical and domestic oils that relate to functionality in food system. Factors considered in evaluation are covered. Chemistry of fats and oils, natural properties of tropical and domestic oils, procesing to alter properties of oils, functional characteristics of fat system, confectionery and snack applications (nut roasting and snack frying centres, frozen novelty coatings, confectionery coatings, tropical coating fats and domestic coating fats) are discussed. SRA

Olive oils

2573

Moreiras-Verela (O), Ruiz-Roso (B), Belmonte (S) and Perez (M). **Influence of two culinary processes, using olive oil and margarine, on bioutilization of protein and vitamin C content of some foods.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 387-396 (Es)

The effects of household frying and stewing on the nutritive value of several foods: potatoes, peppers, beef and fish (hake) were studied. The macronutrients content was determined in all processed foods as well as the protein efficiency ratio (PER) in animal origin foods and the vitamin C retention (as an index of nutritional changes) in vegetable foods. Temp. changes of the culinary medium for each food and type of fat (olive oil and margarine) were also measured. Frying caused a severe reduction of water content in all foods, higher than of stewing. There were no significant differences in the PER of foods of animal origin due to process or culinary fat used. On the other hand, the vitamin C losses of stewed vegetable foods were twice higher than that of fried vegetable foods, whatever the culinary fat used: raw potatoes containing 19.1 mg/100 g fresh wt., contained 13.3 mg after being fried in olive oil and 4.5 mg after being stewed in the same oil. AS

SPICES AND CONDIMENTS

Essential oils

2574

Pino (J), Rosado (A) and Borges (P). **Volatile components in the essential oil of wild oregano (*Coleus amboinicus* Lour).** *Die Nahrung* 34(9): 1990: 819-823

The results of the qualitative and quantitative analysis of the oil of wild oregano grown in cuba is presented. A total of 20 components were identified by liquid-solid chromatograph, GLC and GC-MS, including 13 terpene hydrocarbons and 7 oxygenated compounds. The oil contained about 64% carvacrol. BV

Lemon peel oils

2575

Chamblee (TS), Clark (BCJr), Brewster (GB), Radford (T) and Iacobucci (GA). **Quantitative analysis of the volatile constituents of lemon peel oil. Effect of silica gel chromatography on the composition of its hydrocarbon and oxygenated fractions.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 162-169

Fifty-one constituents accounting for approx. 99.7% of total volatiles common to both Sicilian and California commercial lemon peel oils have been identified and quantified in a single GC capillary run. The quantification was performed by using both internal standard and appropriate response factors, which are necessary for accurate volatile

analysis and simultaneous detn. of non-volatiles. Direct comparisons to results obtained by using area percent or internal standard only show the advantage of using response factors. Fractionation of the oils by open-column silica chromatography facilitated identification of constituents and improved the accuracy of the analysis. Yields of the fractions recovered from the column were usually greater than 96%. The reactivity of high-quality silica gel with lemon hydrocarbons was investigated, and while quantitative effects are small, several oxygenates are formed on the column. Use of a cold (3 C) column significantly reduces the amount but not the number of oxygenates formed. AS

Spices

Coriander

2576

Selot (A), Bera (MB), Mukherjee (S), Keshervani (GP) and Sharma (YK). **Moisture adsorption isotherm, fractionation of bound water and storage stability of coriander seed powder.** *Journal of Food Science and Technology (India)* 28(4): 1991: 216-221

Water activity (a_w) and equilibrium moisture content data of coriander seed powder were obtained at 3 temp. (10, 25 and 50 plus or minus 1 C). The data were analysed for critical moisture content, a_w for max. storage stability using two and three parameter isotherm equations. Various fractions of bound water i.e., primary, secondary and tertiary bound water were also determined. Coriander seed powder was found to be stable for storage in the a_w range of 0.2 - 0.88, which corresponds to equilibrium moisture content 0.0053 - 0.12 kg water/kg dry solid depending on temp. range (10 - 50 C). The primary, secondary and tertiary bound water contents were 2.5, 10 and 54.5% (d.b), resp. AS

2577

Borges (P), Pino (J) and Rosado (A). **The isolation of volatile oil from coriander fruit by steam distillation.** *Die Nahrung* 34(9): 1990: 831-834

In the present work an attempt has been made to establish the conditions for the isolation of the essential oil of coriander fruit by steam distillation and the chem. comp. of the essential oil thus obtained. 18 most important components were identified and quantified by GLC, column chromatography and coupled GC-MS. BV

SENSORY EVALUATION

2578

Mudahar (GS) and Jen (JJ). **Texture of raw and canned jicama (*Pachyrrhizus tuberosus*) and Chinese water chestnut (*Eleocharis dulcis*).** *Journal of Food Science* 56(4): 1991: 977-980

Structural differences of jicama and Chinese water chestnut were examined in this study. Different processes for thermal canning of jicama were developed to retain max. textural properties. Analysis of this study showed that overall textural properties of the vegetables in raw state, jicama texture appeared to be between that of Chinese water chestnut and white potato, and on the basis of fracturability retention upon cooking also the jicama was considered between Chinese water chestnut and white potato. Most cells of jicama maintained structural integrity with min. damage to cell walls from thermal processing. Although raw jicama had good crispness, the cellular structure was different from that of Chinese water chestnut. Jicama lost 65% of its crispness upon canning in water when compared to Chinese water chestnut which lost 20% of its crispness. Processing methods involving blanching to activate pectin methyl esterase, addition of Ca salts and polygalacturonic acid infiltration resulted in improved jicama fruits. This processing method retains good crispness of jicama fruit and may replace Chinese water chestnut in some processed products. SRA

2579

Munoz (J) and Sherman (P). **Dynamic viscoelastic properties of some commercial salad dressings.** *Journal of Texture Studies* 21(4): 1990: 411-426

A controlled stress rheometer (Carrimed CS) was used to carry out oscillatory viscoelastic experiments within the linear viscoelastic region for some commercial salad dressings: mayonnaise, reduced calorie mayonnaise and salad creams. All the mayonnaise samples exhibited higher values of max. stress amplitude which guarantee linear viscoelasticity than either the reduced calorie mayonnaise samples or salad creams. The frequency dependencies of the storage modulus and the phase angle revealed that all the standard mayonnaise samples exhibited similar viscoelastic properties, showing a higher elasticity than the reduced calorie mayonnaise samples and these, in turn had a higher elasticity than salad creams. The absolute magnitude of the complex viscosity, n^*, followed the power law equation with respect to frequency except for the salad creams and was compared to the steady viscosity, $n.n^*/n$ was related to the degree of shear destruction in the structure, which was min. for one of the reduced calorie mayonnaise samples. The viscoelastic properties of the salad dressings studied are related to their different structures. AS

2580

Nussinovitch (A), Kaletunc (G), Normand (MD) and Peleg (M). **Recoverable work versus asymptotic relaxation modulus in agar, carrageenan and gellan gels.** *Journal of Texture Studies* 21(4): 1990: 427-438

Cylindrical specimens of agar, carrageenan and gellan gels (1 and 2%) were uniaxially compressed to various predetermined strain levels and then decompressed. In an independent set of tests, specimens of the same gels were compressed to the same strains and then allowed to relax. Both the percent recoverable work, calculated from the stress-strain relationships in the compression-decompression cycles and the magnitude of the asymptotic relaxation modulus, calculated from the normalized and linearized relaxation curves, decreased as the strain increased. In all 3 gels there was a linear correlation between the percent recoverable work and the magnitude of the asymptotic modulus at corresponding strains, a sign that both parameters are indicative of these gels' degree of elasticity and the latter's strain dependency. AS

2581

Castell-Perez (ME) and Steffe (JF). **Evaluating shear rates for power law fluids in mixer viscometry.** *Journal of Texture Studies* 21(4): 1990: 439-453

Established mixer viscometry methods, the viscosity matching and the slope methods, were evaluated for determining av. shear rates when agitating time-independent, non-Newtonian fluids. Results indicate that the use of a constant value of the mixer proportionally constant, k', is not valid for all ranges of fluid rheological properties, system geometry (impeller and cup) and impeller rotational speed. A small impeller-to-cup diameter ratio and impeller rotational speeds greater than 0.33 rev/s (20 r.p.m.) provide the optimum operating parameters for evaluation of k'. AS

2582

Mioche (L) and Touraille (C). **Texture profile set up for oral analysis of food.** *Sciences Des Aliments* 10(3): 1990: 697-711 (Fr)

2583

Watase (M), Nishinari (K), Williams (PA) and Phillips (GO). **Effect of ammonium salts on rheological and thermal properties of kappa-carrageenan gels.** *Food Hydrocolloids* 4(3): 1990: 227-237

In order to clarify the relationship between structure and properties, dynamic viscoelastic measurements and differential scanning calorimetry were carried out for kappa-carrageenan gels containing ammonium salts. Elastic modulus E' of kappa-carrageenan gels as a function of the concn. of NH_4F, NH_4Cl, NH_4Br or NH_4I increased with increasing concn. of salt and then decreased. In the case of gels containing iodide ions, the peak of E' increased and shifted to higher concn. This has been attributed to the rearrangement of kappa-carrageenan molecules towards a more stabilized structure in the presence of iodide ions. The endothermic peak temp. accompanying gel-to-sol transitions shifted to higher temp. with increasing concn. of salt. This has been attributed to the shielding of the electrostatic repulsion of sulphate groups in kappa-carrageenan molecules by ammonium ions as in the case of the addition of alkali metal or alkali earth metal ions or guanidinium ions. In both thermal and rheological properties, gels containing iodide ions showed different behaviour to those containing bromide, chloride or fluoride ions. AS

2584

Buitenhuis (J) and Kanters (JA). **Comments on Shallenberger's chiral principles contained in structure-sweetness relations.** *Food Chemistry* 40(1): 1991: 109-112

The explanation given by Shallenberger of the difference in sweet taste of D- and L-amino acids as opposed to the sweet taste of enantiomeric forms of sugars is found to be in error. The chiral principles applied by Shallenberger are briefly reviewed, taking into account that the topism terminology is commonly used for comparison of groups or sides within one structure and not for comparison of two structures where isomerism terminology should be used. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Pesticides

2585

Rangaswamy (JR) and Sasikala (VB). **Comparitive responses of coffee species to phosphine fumigation.** *Journal of Food Science and Technology (India)* 28(4): 1991: 222-225

Robusta coffee bean on fumigation has a higher phosphine (PH_3) holding capacity and holds a

higher free PH 3 residue than Arabica. Robusta with a higher residue desorbs larger amounts of PH 3 than Arabica. Preliminary work with the wax of Robusta coffee suggests the differences in modes of PH 3 retention by coffee bean and its wax. Oxidation of phosphine in these coffee species is predominant. AS

BIOCHEMISTRY AND NUTRITION

2586

Jackson (LS) and Lee (K). **Microencapsulated iron for food fortification.** *Journal of Food Science* 56(4): 1991: 1047-1050

Lipid microcapsules of $FeSO_4$, alone or with ascorbic acid, and $FeCl_3$, were developed to fortify cheese and other high moisture foods with Fe. Varying lipid coat comp. and amount of core Fe sol. optimized their stability. A high melting fraction of milk fat (m.p. 43.5 C) was oxidized by Fe and was thus unsuitable as coat material. Microcapsules made with cottonseed stearine (m.p. 62.8 C) had good oxidative stability and retained more Fe under rapid stirring at 39 C than those made with hydrogenated milk fat (m.p. 49.0 C). Microcapsules having good oxidative stability and low leakage of Fe were coated with stearine and had a ratio of 0.10g Fe sol./g lipid coat. Microencapsulation may allow fortification of cheese and other Fe sensitive foods. AS

2587

Kim (YA) and Barbeau (WE). **Evaluation of SDS-PAGE method for estimating protein digestibility.** *Journal of Food Science* 56(4): 1991: 1082-1086

2588

Vaishali Agte and Sadhana Joshi. ***In vitro* binding of bile salts with plant fibres.** *Journal of Food Science and Technology (India)* 28(4): 1991: 226-229

In vitro binding of sodium cholate and sodium taurocholate with 5 and 10 m mole by 27 dietary fibres from leafy vegetables, other vegetables, pulses and cereals commonly consumed in India was studied at pH 8.0. Analysis of variance indicated that these plant fibres behave similarly within a group but differ from each other as a group ($P < 0.01$). Leafy vegetables showed the highest % binding for both the bile salts foliowed by pulses, cereals and other vegetables. Binding response of both the bile salts showed a correlation of 0.92, 0.65 at 5 and 10 m mole concn. Per cent binding was higher at 5 than at 10 m moles indicating that available binding sites were nearly saturated at 5 m mole concn. Multiple regression analysis of components of fibre indicated that binding of bile acids is mainly contributed by hemicellulose component of plant fibres. AS

2589

Malkit Nagi and Mann (SK). **Nutrient intake by Punjabi women with special reference to iron availability.** *Journal of Food Science and Technology (India)* 28(4): 1991: 230-233

Ninety young women in the age group of 16 - 20 yr were classified into 3 groups of 30 each on the basis of their haemoglobin and food habits i.e. anaemic lacto-vegetarian (ALV), anaemic non-vegetarian (ANV) and non-anaemic (NA) groups. The av. haemoglobin (Hb) levels of the subjects of ALV, ANV and NA groups were 10.4 plus or minus 0.11, 10.7 plus or minus 0.13 and 12.5 plus or minus 0.10 g/dl resp. The ionizable iron accounted for 5.97 to 7.06% of the total iron in the diets consumed by all the subjects in both the seasons and was comparatively higher in the diets of ANV group. The mean dietary Fe was inadequate while protein, Ca and ascorbic acid were adequate in all the groups and were significantly higher ($P < 0.05$) only in the NA group. However, the intake of tannins during winter was significantly higher ($P < 0.05$), than in summer in all the groups while the intake of dietary fibre, phosphates, phytates and oxalates was almost the same in all the groups. AS

2590

Pramila (SS), Annamma Kumar and Rita Raghuvanshi. **Nutrient composition of some uncommon foods consumed by Kumaon and Garhwal hill subjects.** *Journal of Food Science and Technology (India)* 28(4): 1991: 237-238

The detn. of the proximate principles and some of the essential nutrients in 10 uncommon foods of Uttar Pradesh (India) had revealed that several of these foods contain high amounts of certain important dietary factors. These include protein and fat in Bhanjira (*Perilla frutuscens*) and Chilu seeds (*Prunus armeniaca* Willd); Ca and β-carotene in Beng (*Basella alba* Willd) and Bichhu ghaas (*Urtica dioica* L.); carbohydrates in Gaderi (*Colocasia esculenta*), Gathi (*Dioscorea bulbifera* Linn), Bannda (*Alocasia macrorrhiza* Schott); ascorbic acid in Kunja (*Rosa moschata* Hermm), Mehal (*Pyrus pashia* Buch Ham ex O Don.) and Mongra (*Raphanus sativus* var *caudatus*). AS

2591

Cserhati (T) and Szogyi (M). **Interactions between proteins, peptides and amino acids. New advances 1986-1989.** *Die Nahrung* 34(9): 1990: 803-810

Recent achievements in the study of the various interactions between protein, peptides and amino acids is reviewed. The effect of the interaction on protein (peptide) association, structure and biological activity as well as the role of individual amino acid residues in the hydrophobic and hydrophilic interactions are discussed. 89 references. BV

2592

Gekko (K) and Yamagami (K). **Flexibility of food protein as revealed by compressibility.** *Journal of Agricultural and Food Chemistry* 39(1): 1991: 57-62

To elucidate the flexibility-structure-function relationships of food proteins, the adiabatic compressibility, β_s, of 14 egg and milk proteins was determined by means of sound velocity and density measurements in aqueous solutions at 25 C. All the proteins showed positive β_s values, indicating the large internal flexibility characteristic of the protein molecules. On the basis of statistical analyses of β_s previously reported for globular proteins, the flexibility-structure relationship is discussed in terms of the internal cavity and hydration, focusing on the hydrophobicity of proteins. It was found that the protease susceptibility, foaming capacity, and free energy of unfolding of proteins are positively correlated to β_s. This result indicates that the flexibility of the structure plays an essential role in the conformational stability and functional properties of food proteins. AS

2593

Oates (CC) and Ledwared (DA). **Studies on the effect of heat on alginates.** *Food Hydrocolloids* 4(3): 1990: 215-220

Differential rates of depolymerization of two alginate samples of low moisture content and with different ratios of mannuronic and guluronic acids were found by estimates of the number of end groups, gel permeation chromatography and relative reactivity toward amino groups. Samples with a high level of mannuronic acid residues were far less heat stable. Two methods for estimating number av. mol. wt. were used: differences between the values were evident with apparently less depolymerization occuring in the samples as measured by end group analysis. AS

2594

Yuan (YV), Kitts (DD), Nagasawa (T) and Nakai (S). **Paracellular calcium absorption, femur mineralization and biomechanics in rats fed selected dietary proteins.** *Food Chemistry* 39(2): 1991: 125-137

2595

Ajayi (OA) and Korede (O). **Protein and vitamin B 6 content of foods consumed by Nigerian adolescents.** *Food Chemistry* 39(2): 1991: 229-235

The moisture, protein and vitamin B 6 contents of foods commonly consumed in Nigeria were determined. Subsequently, dietary protein and vitamin B 6 consumption of 41 adolescents resident in a post primary Institution were assessed over a 7-day period. The vitamin B 6 content of the foods as estimated by chemical method correlated strongly ($r = 0.8562$, $P < .0.001$) with values obtained from microbiological assay (using *Saccharomyces uvarum* as test organism). Likewise, a strong and positive correlation existed between protein and vitamin B 6 content as determined by chemical assay ($r = 0.3927$, $P < 0.02$) or by microbiological assay ($r = 0.7161$, $P < 0.002$). Vitamin B 6 intake of the adolescents also correlated significantly ($r = 0.8741$, $P < 0.001$) with protein intake. The daily mean vitamin B 6 and protein intake was 1.5 plus or minus 0.34 mg and 62.1 plus or minus 13.1 g, resp. The findings indicate that population groups that consume staple diets based on roots and tubers or those who do not meet their needs for protein would have poor vitamin B 6 status. Since institutional diets are often better than diets consumed in many homes, an extensive study of vitamin B 6 consumption patterns of other population groups is suggested. AS

TOXICOLOGY

2596

Smith (CJ), Williams (PA), Jones (M) and Phillips (GO). **Procedure for the detection of aflatoxins in gum arabic samples.** *Food Hydrocolloids* 4(3): 1990: 221-225

In the light of recent warnings regarding the possible presence of aflatoxin in gum arabic samples, the usefulness of a commercially available ELISA system for the detection of these compounds in food was studied as a screening technique for gum arabic. A series of gum arabic samples were assayed, as were the same samples deliberately spiked with aflatoxin. The results confirmed that the assay system was capable of determining aflatoxin in the concn. range 2.0 - 200 p.p.b. in the presence of gum arabic. None of the 16 untreated samples contained any detectable aflatoxin. AS

2597

Pence (BC). **Dietary selenium and antioxidant status: Toxic effects of 1,2-dimethylhydrazine in rats.** *Journal of Nutrition* 121(1): 1991: 138-144

Weanling male Sprague-Dawley rats were used to determine whether the mechanism of the previously reported toxicity of 1,2-dimethylhydrazine (DMH) in selenium-deficient rats was related to a diminished capacity for detoxification of reactive oxygen species via glutathione peroxidase (GSH-Px) as well as by other known pathways of detoxification, including catalase (CAT), superoxide dismutase (SOD), glutathione-S-transferase (GST) and levels of glutathione (GSH). A 3 x 3 factorial experimental design was used to examine the acute effects of DMH treatment (0, 10 and 20 mg/kg body wt.) interacting with dietary Se levels (< 0.02, 0.1 and 0.5 mg/kg diet as sodium selenite). Animals were maintained on the test diets for 4 wk prior to challenge with DMH. Preliminary kinetic studies indicated the most appropriate time to examine antioxidant status was 3 h after DMH injection. At that time, livers and colons were analyzed for tissue levels of GSH-Px, CAT, SOD, GST and GSH. Data analysis demonstrated that Se deficiency impaired the ability of both liver and colon to mount an induced detoxification response to the acute oxidative stress generated by DMH challenge and may explain the toxicity of DMH in Se-deficient rats. AS

2598

Martin (R), Hernandez (PE) and Sanz (B). **Mycotoxicosis as foodborne diseases.** *Revista de Agroquimica Y Technologia de Alimentos* 30(3): 1990: 315-332 (Es)

In this review the mycotoxins that represent a potential health hazard to man are described. Major factors influencing their synthesis, action mechanism, detection methods, control measures and regulations regarding these interesting compounds, are considered. BV

2599

Lickly (TD), Markham (DA) and Rainey (ML). **The migration of acrylonitrile from acrylonitrile/butadiene/sytrene polymers into food-simulating liquids.** *Food Technology* 29(1): 1991: 25-29

The correlation of residual acrylonitrile (AN) monomer concn. in AN-containing polymers with AN migration into foods simulants is of interest because of US FDA regulates the use of these polymers on the basis of the amount of AN that may migrate into food simulants. Studies of the migration of AN into water from seven acrylonitrile/butadiene/sytrene polymers with varying comp. and residual AN levels showed that a linear relationship exists between the concn. of AN in the polymer and the amount of AN migrating, for a given set of exposure conditions. A linear relationship was also observed between the diffusion coeff. generated from the experimental data using a simple Fickian diffusion model and the inverse of absolute temp. of exposure. AS

2600

Samarajeewa (U), Sen (AC), Fernando (SY), Ahmed (EM) and Wei (CI). **Inactivation of aflatoxin B_1** in corn meal, copra meal and peanuts by chlorine gas treatment. *Food and Chemical Toxicology* 29(1): 1991: 41-47

More than 75% degradation of aflatoxin B_1 (AFB_1) was achieved after treatment of AFB_1-spiked corn meal, spiked copra meal (the residue of the kiln-dried coconut kernels after mechanical expulsion of oil) and peanuts artificially infected with *Aspergillus parasiticus*, with 11, 16 and 35 mg chlorine gas per g meal or peanuts, resp. At these chlorine gas treatment levels, extension of the exposure period of the corn meal and copra meal beyond 2.5 h, and the peanuts beyond 1 day, did not increase the percentage degradation of AFB_1. The mutagenicity of chlorine-treated copra meal and peanuts spiked with AFB_1 was greatly reduced compared with untreated controls, as determined in *Salmonella typhimurium* strain TA98 in the presence of rat liver S-9 mix; the reduction in mutagenicity was found to be highly correlated with the reduction of AFB_1 levels. Reactions of chlorine with AFB_1 or constituents of the meals or peanuts did not appear to generate new mutagenic compounds. The moisture content of the meals and peanuts appeared to be an important factor affecting the degradation of AFB_1 by chlorine gas. AS

2601

Keerthinarayana (S), Vijayshankar (YN), Shivalingaiah (B) and Visweswariah (K). **Sorption mechanism of DDT from aqueous phase.** *Journal of Environmental Science and Health* 25(4): 1990: 493-509

Sorption is one among the many techniques available for the removal of organic materials from potable water and waste water. Use of locally available Wood Charcoal (WC) is essential in place of costly activated charcoal to make the process more economical and lucrative. The vital objective of this investigation was to assess the performance of WC for the removal of DDT from the aqueous phase. The influence of important factors like, particle size, pH, and time of contact, which affects the sorption process was studied in this investigation using batch experiments. The removal kinetics were carried out under the temp. 27 plus or minus 1 C (room temp.) and the sorption kinetics constants were evaluated. Sorption equilibra study

has also been carried out to develop the Freundlich's sorption isotherm equation from which the ultimate sorption capacity of WC for sorption of DDT was calculated. AS

Nil

Acetic acid
beef muscle, acetic acid & rheological properties of raw/cooked 2488
Acid
persimmon, maturation & nonvolatile acid comp. of 2422
processed food, acid & pH modification of 2303
wheat gliadin, acid deamidation & functional properties of 2363
yoghurt, cheese whey protein/mineral salt & acid production in soy-based 2458
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